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ABSTRACT

This report presents data on Federal Research and Development (R&D) funding levels by overall totals and by selected subcategories. The data cover all Federal agencies that sponsor R&D programs. Data for 1977 and 1976 are estimated since programs are subject to later appropriations, apportionment, and reprogramming. Earlier years reflect completed congressional and executive actions. The purpose of the series is to provide a perspective on trends and relationships among important Federal R&D components. Some of the highlights of the report include: (1) Federal R&D obligations were expected to increase 13.5% in 1976 and 8.6% in 1977; (2) In constant dollars, the 1977 total is estimated as 20% lower than in 1967; (3) DOD and ERDA account for almost all the 1977 growth; (4) 74% of the 1977 budget will be obligated to people and agencies outside the Federal government; and (5) Every state received some support, though California, Maryland, Massachusetts, and New York each received more than $1 billion. (Author/RH)

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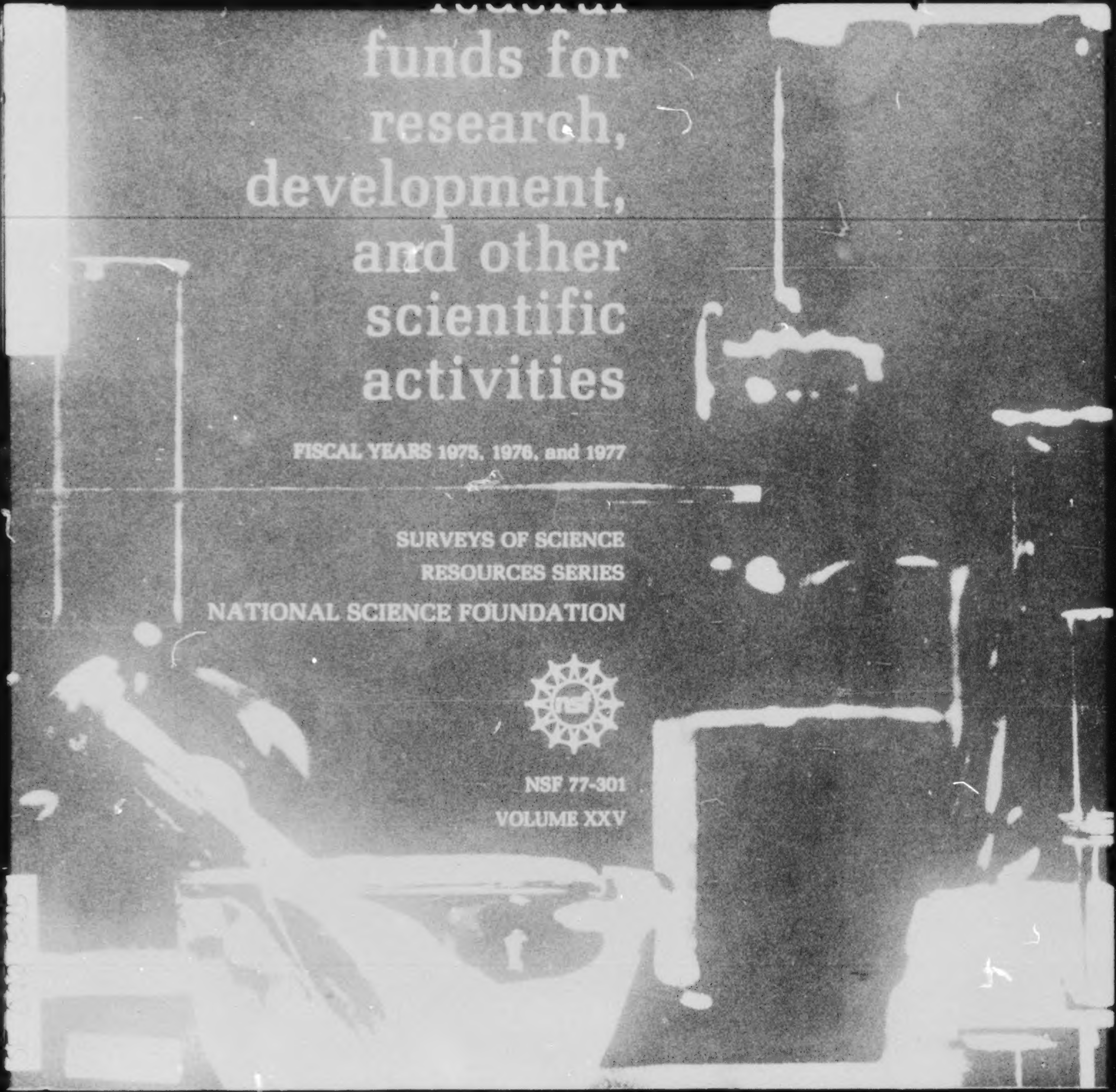

Federal funds for research, development, and other scientific activities

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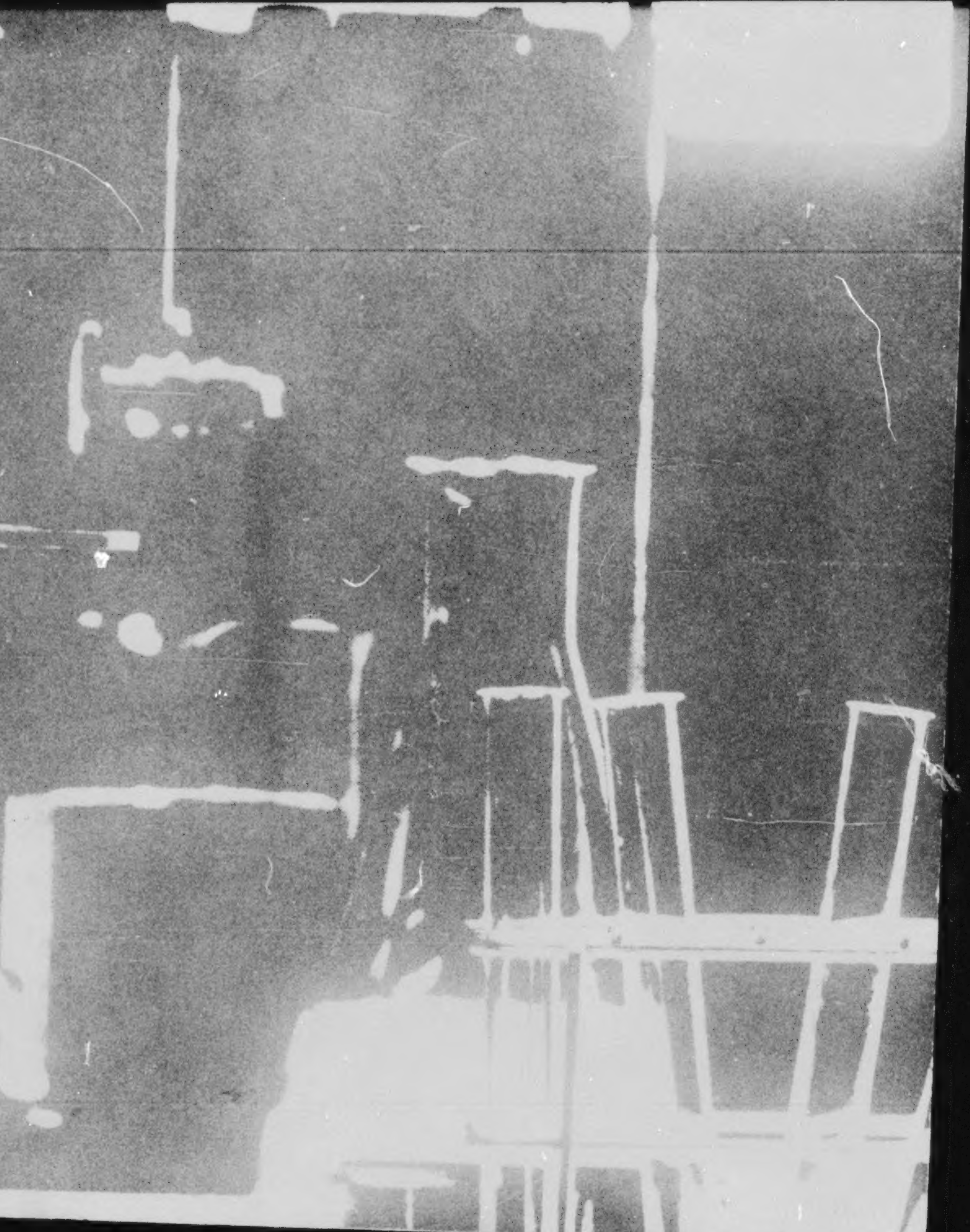

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Detailed Statistical Tables. Federal
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for Scientific Activities at Unive
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1985 R&D Funding Projections ...

National Patterns of R&D Resourc
& Manpower in the United State
1976 ....

HIGHLIGHTS

"Federal Agencies Allocated $4.5 B
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"Energy Increase of 18 Percent Pac
Industrial R&D Spending in 197

"Federal R&D Funding Shows Mod
for FY 1977"................

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REPORTS	NSF No.	Price
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Detailed Statistical Tables. Federal Funds for Research, Development, and Other Scientific Activities, Fiscal Years 1975, 1976, and 1977, Volume XXV	76-315	—
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HIGHLIGHTS		
"Federal Agencies Allocated $4.5 Billion to Universities and Colleges in FY 1975"	76-327	—
"Energy Increase of 18 Percent Paces Industrial R&D Spending in 1975"	76-324	—
"Federal R&D Funding Shows Moderate Increase for FY 1977"	76-317	—

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FOREWORD

This report is the latest in an annual s
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based on the Presidential budget request
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Charles E. Falk, Director, Division of Scie
cial supervision of William L. Stewart, He

December 1976

FOREWORD

This report is the latest in an annual series that presents data on Federal R&D funding levels by overall totals and by selected subcategories. The data cover all Federal agencies that sponsor R&D programs. Each new report is based on the Presidential budget request to Congress, in this case, for fiscal year 1977. Data for both 1977 and 1976 are estimated since programs are subject to later appropriations, apportionment, and reprogramming. Earlier years, however, reflect completed congressional and executive actions. The purpose of the series is to provide a perspective on trends and relationships among important Federal R&D components.

The National Science Foundation is appreciative of the cooperation of the staffs of participating Federal agencies, who made careful efforts to meet the survey requirements. This report was prepared under the general guidance of Charles E. Falk, Director, Division of Science Resources Studies, and the special supervision of William L. Stewart, Head, R&D Economic Studies Section.

Richard C. Atkinson
Acting Director
National Science Foundation

December 1976

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note

In tables and charts, details may not add to totals because of rounding. Also, percentages appearing in the text were calculated on the basis of thousands of dollars and may differ from percentages derived by the user from text tables that are shown in millions of dollars.

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fiscal years 1976–78, as well as in the

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This report was prepared in the
under the direction of Benjamin Olsen
Group. Responsibility for interpreting
ing of the report was taken by Barbar
K. Ham prepared statistical material

subsequent appropriations and apportionment actions

The data appearing in this report for fiscal year 1977 were compiled between March and May 1976. They are based on *The Budget of the United States Government, Fiscal Year 1977*, as submitted by the President to the Congress in January 1976, and do not reflect subsequent congressional actions or changes made by Executive apportionment. Based on estimates made in the next budget in January 1977, Federal R&D obligations for 1977 were increased from the $23.5 billion appearing in this report to approximately $24.5 billion. Estimated increases from the levels shown herein for the Department of Health, Education, and Welfare ($372 million), the Energy Research and Development Administration ($330 million), the National Aeronautics and Space Administration ($253 million) and the Environmental Protection Agency ($64 million) more than offset a decrease for the Department of Defense ($93 million). Other agency changes did not significantly affect the Federal R&D total. More detailed and further revised information on 1977 R&D obligations will be presented in an NSF *Highlights* in mid-1977 covering fiscal years 1976-78, as well as in the next *Federal Funds* report.

acknowledgments

This report was prepared in the Division of Science Resources Studies under the direction of Benjamin Olsen, Study Director, Government Studies Group. Responsibility for interpreting the data and for organization and writing of the report was taken by Barbara Leach and Eleanor Stoddard. Dorothy K. Ham prepared statistical material and graphic illustrations.

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CONTENTS

Highlights ....

Introduction ....

Part I. Federal Funds for Research, Devel
and R&D Plant ....

Section

1. Federal R&D Perspectives ....
2. Programs and Performers ....
3. Basic Research ....
4. Applied Research ....
5. Development ....
6. Geographic Distribution, 1975 ....

Part II. Federal Funds for Scientific and

Appendixes

A. Technical Notes ....
B. Federally Funded Research and De
C. Statistical Tables, Part I[1] ....
D. Statistical Tables, Part II[1] ....

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[1] See note on p. 62

CONTENTS

Highlights vii

Introduction viii

Part I. Federal Funds for Research, Development and R&D Plant 1

Section

1. Federal R&D Perspectives 2
2. Programs and Performers 7
3. Basic Research 20
4. Applied Research 25
5. Development 30
6. Geographic Distribution, 1975 35

Part II. Federal Funds for Scientific and Technical Information 46

Appendixes

A. Technical Notes 54

B. Federally Funded Research and Development Centers 61

C. Statistical Tables, Part I[1] 62

D. Statistical Tables, Part II 71

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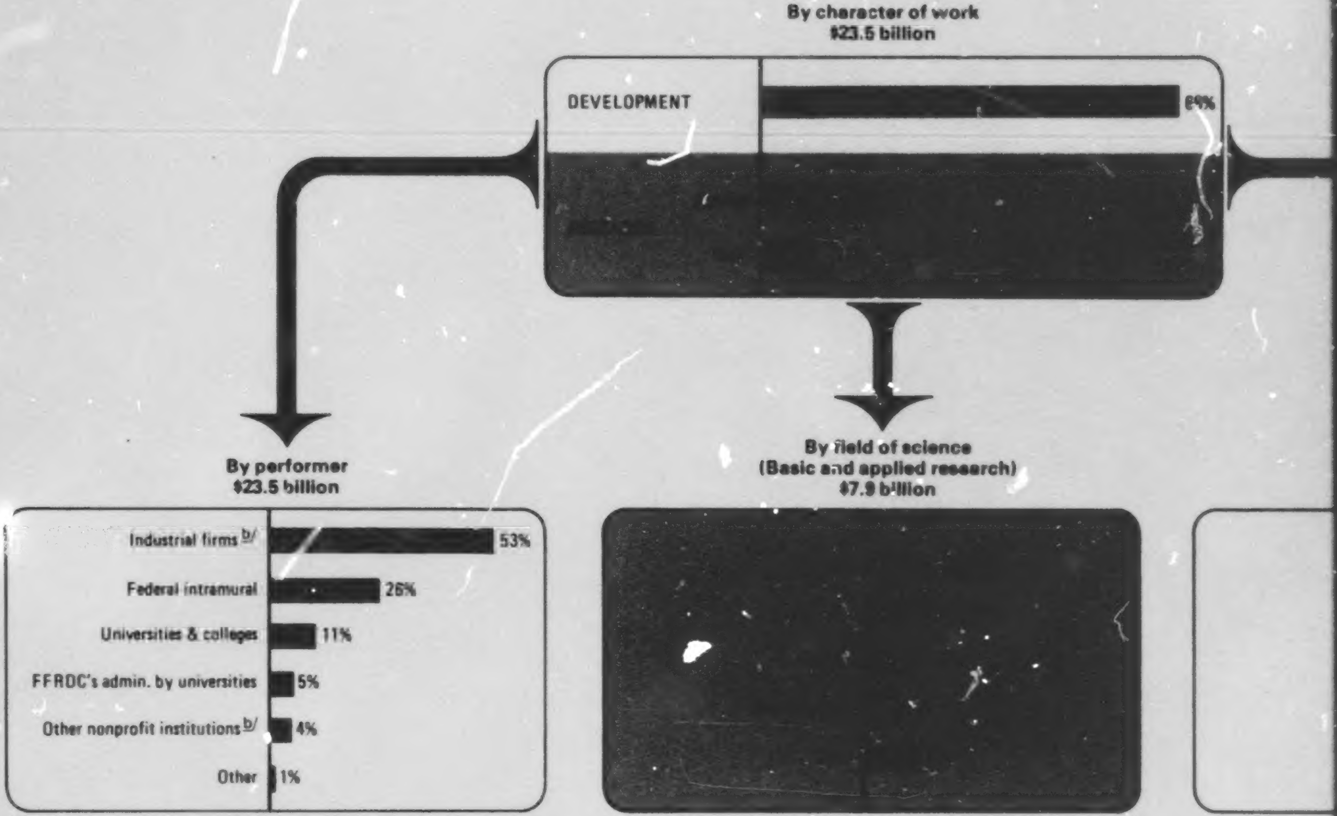
[1] See note on p. 62

Distribution of Federal obligations for research and development:[a] FY 197

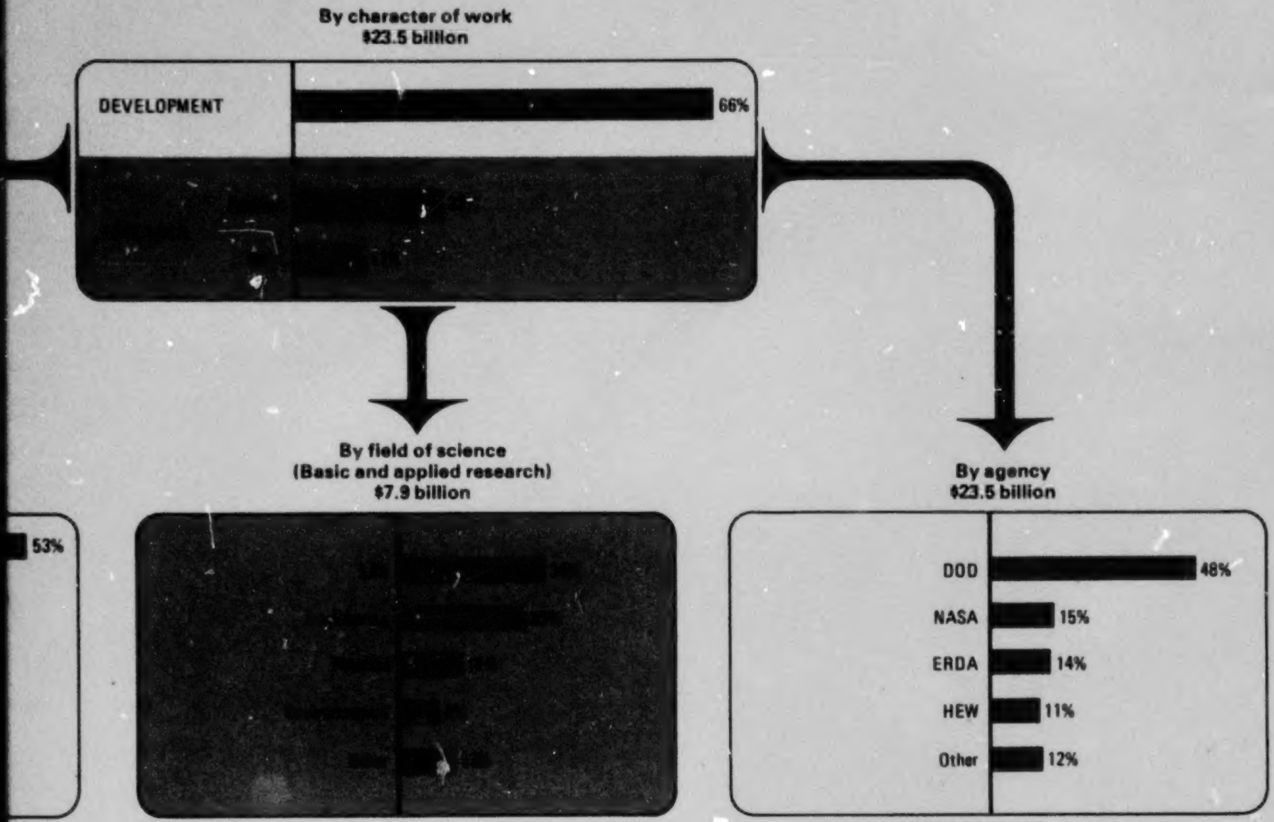


[a] Excludes R&D plant.

[b] Includes Federally Funded Research and Development Centers (FFRDC's) administered by this sector.

SOURCE: National Science Foundation

of Federal obligations for research and development:[a] FY 1977 (est.)



HIGHLIGHTS

- Federal R&D obligations (plant excluded) were expected to rise from $19.0 billion in fiscal year 1975 to $21.6 billion in fiscal year 1976 and $23.5 billion in fiscal year 1977. The increases of 13.5 percent in 1976 and 8.6 percent in 1977 were greater than known or anticipated inflation.

- Despite the strong growth of the most recent years the Federal R&D funding total for 1977 is lower in real terms than 10 years earlier. In constant dollars the 1977 total is an estimated 20 percent lower than in 1967.

- In 1977 R&D and R&D plant outlays were expected to represent 6.0 percent of total Federal budget outlays, compared with 5.7 percent in 1976 and 12.6 percent in 1965, the year this ratio reached its highest point.

- As a share of relatively controllable budget outlays, R&D and R&D plant outlays were expected to be 14.9 percent in 1977 compared with 13.5 percent in 1976 and 16.3 percent in 1967.

- Although the national R&D total grew steadily from $23.2 billion in 1967 to an estimated $38.1 billion in 1976 (latest available year), Federal R&D support did not rise proportionately. In the same period the share of Federal R&D expenditures in the national R&D total fell from 62 percent to an estimated 53 percent. Increases in industrial expenditures made up most of the difference in the 1967-76 period.

- Among the leading agencies in R&D support DOD and ERDA in 1977 account for almost the entire growth over 1976 in the Federal R&D total. For the longer term, however, chief growth is shown for ERDA and HEW. Between 1967 and 1977 the R&D programs of DOD showed an estimated 39-percent increase compared with R&D growth for ERDA of 161 percent in the same period and growth for HEW of 121 percent. NASA, by contrast, reflected a drop of 27 percent.

- In 1977 an estimated $17.4 billion, o
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- Federal obligations to industrial
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- In 1977 an estimated $17.4 billion, or 74 percent of the Federal R&D total, will be obligated to extramural performers. The remaining $6.1 billion, or 26 percent, will support Federal intramural performance.

- Federal obligations to industrial firms (including FFRDC's) were expected to increase 14 percent in 1977 over 1976, but obligations to universities and colleges, only 3 percent. The Federal intramural effort was scheduled for a 2-percent increase.

- Basic research obligations were expected to amount to $2.5 billion in 1977, or 7 percent more than 1976. This figure is a record high, but it reflects a drop of an estimated 18 percent from 1967 in constant dollars. As a share of the Federal R&D total, basic research was expected to be 11 percent in 1977, the same share it has represented since 1967.

- Applied research obligations were scheduled to increase 2 percent in 1977 to an estimated $5.3 billion, also a record high. In real terms they were approximately the same as in 1967. The share of applied research within the Federal R&D total was an estimated 23 percent in 1977, up from an 18-percent share in 1967.

- Development obligations were estimated at $15.6 billion in 1977, another record amount, and 11 percent higher than the 1976 total. In constant dollars, however, the 1977 total is an estimated 26 percent lower than the development total in 1967. As a share of the Federal R&D total, development was expected to amount to 67 percent in 1977.

- In 1975 four States—California, Maryland, Massachusetts, and New York—each received more than $1 billion in Federal R&D support. California continued to be the leading State by a wide margin, with 26 percent of the total. Every State received some support in 1975, and more than $100 million was directed to each of 25 States, including the District of Columbia.

INTRODUCTION

Data have been collected by the Nat
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Federal Funds for Research, Develo
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in this report are aggregates of R&D o
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totals were available.[3]

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[1] See Office of Management and Budget, *S*
Government, Fiscal Year 1977, "Special Ana
(Washington, D.C.) 1976, p. 276.

[2] National Science Foundation, *Detailed St*
velopment, and Other Scientific Activities, Fisc
76-315) (Washington, D.C. 20550), 1976. These

[3] National Science Foundation, *Science Reso*
Shows Moderate Increase for FY 1977" (NSF 76-

RODUCTION

Data have been collected by the National Science Foundation on R&D funding by Federal agencies for 25 successive years. Over this period the data have been divided into an increasing number of categories of interest to particular groups. These categories include character of work, performers, fields of science, R&D distribution by States, and university research by fields of science. Obligational data for R&D plant and for scientific and technical information activities are also collected. Because Federal R&D support is sizable, representing more than one-half of all national R&D expenditures, many groups, both public and private, are interested in studying trends and changes in the overall totals and the constituent parts. Federal R&D funding touches on issues of interest to government policy-makers, to institutions within the different sectors of the economy, to economists and historians, and to the scientific community.

Federal Funds for Research, Development, and Other Scientific Activities represents a later and more detailed analysis of the R&D component in the Federal budget than the one that appears with the budget document.[1] The data in this report are aggregates of R&D obligational levels as reported to the *Federal Funds* survey by 91 agencies in the March-May period of 1976, following the President's budget message in January. All Federal agencies with R&D programs responded, and their data were based on budget request levels. Data were edited and processed by NSF staff and appendix tables prepared by computer processing and made available by midyear.[2] A brief analysis of the contents of *Federal Funds*, Volume XXV was also published as soon as survey totals were available.[3]

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[1] See Office of Management and Budget, *Special Analyses, The Budget of the United States Government, Fiscal Year 1977*, "Special Analysis P: Research and Development Programs" (Washington, D.C.) 1976, p. 276.

[2] National Science Foundation, *Detailed Statistical Tables, Federal Funds for Research, Development, and Other Scientific Activities, Fiscal Years 1975, 1976, and 1977*, Volume XXV (NSF 76-315) (Washington, D.C. 20550), 1976. These are obtainable gratis on request to NSF.

[3] National Science Foundation, *Science Resources Studies Highlights*, "Federal R&D Funding Shows Moderate Increase for FY 1977" (NSF 76-317), (Washington, D.C. 20550), August 10, 1976.

The aggregates in this series are sometimes loosely referred to as the Federal R&D budget, but this is a misnomer. No budget for research and development exists, as such. No R&D total is determined by one specific decision. Rather, the final total that represents the R&D portion of any Federal budget is the result of innumerable decisions in regard to the programs of separate organizations. Decisions on the size and nature of R&D programs are based on the way they support agency missions and not on the way R&D functional elements relate to one another within the total budget.

The R&D distribution that is shown from one year to the next represents a weighting of the relative importance of different kinds of R&D effort, although caution should be used in equating levels of effort with priorities. Some kinds of R&D programs have a high cost if they are undertaken at all, and others have relatively low costs; yet the priority of such programs might be equal.

The truest perspective on Federal R&D efforts is shown by "actual year" data. Since surveys have been conducted at the midpoint of the middle fiscal year in each 3-year budget cycle, the earliest year shows "actual" data, and the second two show estimates. In this report the actual year is 1975, and estimated years are 1976 and 1977. Of these, 1976 data to a large extent reflect the effects of appropriations, apportionments, and reprogramming, although not entirely, while 1977 data are still subject to the whole cycle of congressional appropriation action and subsequent executive apportionment and reprogramming.

This report is the first one in which the budget year 1977 is based on the new October 1-September 30 budget period, as established by Congress. A 3-months period, July 1-September 30, 19
R&D data were collected for those month
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months period, July 1-September 30, 1976, provided the transition. Federal R&D data were collected for those months in broad totals only, distributed by character of work (basic research, applied research, and development) but by no other categories; R&D plant data were additionally given. Detailed data will be shown in the *Federal Funds* reports on an historical basis by 12-month periods for comparability, but if aggregate amounts spent over a period of time on Federal R&D programs are needed, the transition data are available.

While the statistics in this report do not reflect accounting precision, they are sufficiently comparable from one year to the next to provide an accurate measure of trends. Some borderline problems exist in that some R&D programs are not clearly defined as such. Most R&D programs have to be separated by respondents from other larger programs because they are not identified as budget line items, and in certain cases questions arise as to appropriate classification. R&D programs, once identified, must then be further subdivided into the survey categories: basic research, applied research, development, performers, fields, etc. Since agency records are often kept by categories other than those requested in the survey, judgment in reporting data must be used by respondents.

The interaction that takes place, however, between NSF staff and many respondents serves to clarify concepts and definitions and develop precision in reporting. Agencies are users as well as producers of these data. Other users besides agencies include congressional staff, Federal science administrators, performers in the private sector, researchers in science policy, and the science press. The data serve as a baseline for determining trends and also as a starting point for more intensive studies.

Part I

FEDERAL FUND RESEARCH, DE AND R&D PLAN

Part I

FEDERAL FUNDS FOR RESEARCH, DEVELOPMENT, AND R&D PLANT

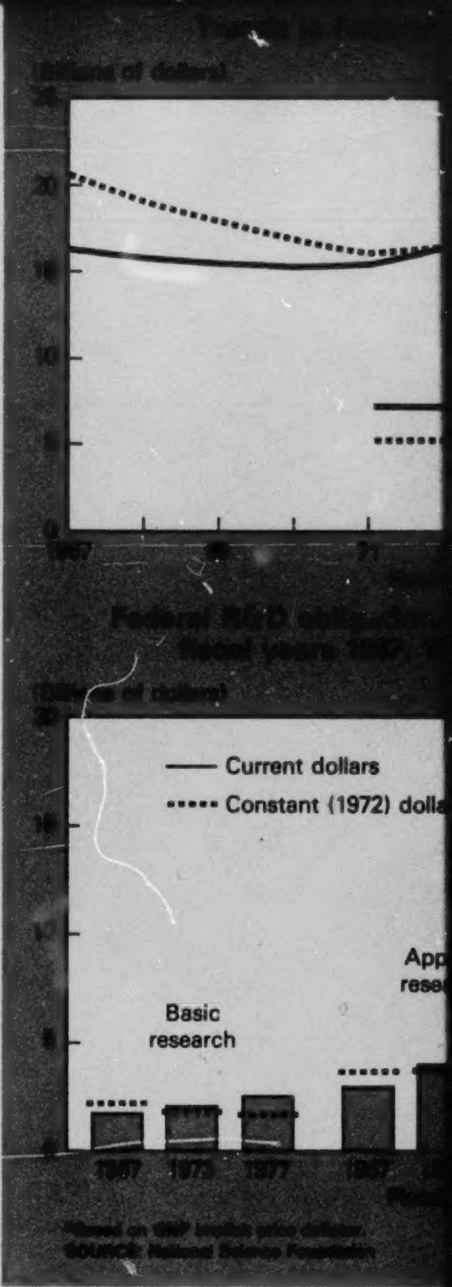
Section 1. FEDERAL R&D PERSPECTIVES

A strong rise is reflected in Federal R&D obligations for the 1975-77 budget period. From a level of $19.0 billion for fiscal year 1975 growth to $21.6 billion was expected in fiscal year 1976, or 13.5 percent. The increase to the $23.5 billion requested in the President's budget for 1977 represented a gain of 8.6 percent. Both of these increases were greater than known or anticipated inflation. An adjustment to constant dollars would show growth of 6.4 percent in 1976 and an estimated 2.2 percent in 1977.[1]

The rising trend for the current (1975-77) period contrasts with the trend of the years just previous. After 1967, the high point for Federal R&D funding in real terms, a steady downward course was shown for Federal R&D funding levels until 1971. After a 1.4 percent-rise in 1972, constant-dollar totals once again declined until 1975 (although the decline in 1975 was slight). Thereafter the trend has been definitely upward, and even though final appropriation and apportionment actions will alter the rates of change to some extent, the two most recent years reflect growth in a number of larger R&D programs that has been built into the program structure and is unlikely to be reversed.

A real reduction has occurred, however, in the overall Federal level of R&D funding in the past decade. In constant dollars the 1977 total is still an estimated 20 percent lower than in 1967 even though considerable variance from this situation is found among individual agencies and performer groups.

Federal R&D funding is somewhat understated in that no data are included for the independent research and development (IR&D) carried on by industry and financed indirectly by the Federal Government as part of defense procurement contracts. At present these allowances are estimated at $500 million annually. Much R&D activity is also engendered by Federal tax and cost-sharing policies. Industrial firms are permitted to treat R&D expenditures as current costs rather than investments to be depreciated over a number of years, and thus they save substantially on taxes. Further, incentives are offered State and local governments and the private sector through Federal cost-sharing in R&D undertakings, notably in the agriculture and energy fields.[2]



*Based on GNP implicit price deflator.
SOURCE: National Science Foundation

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[1] In the absence of a reliable R&D cost index, the GNP implicit price deflator was used for the years previous to and including 1976, and an estimate was made for inflation in 1977. Deflators were based on fiscal-year periods and were derived from data provided by the Bureau of Economic Analysis, Department of Commerce. On this basis inflation for fiscal year 1976 was 6.7 percent. The estimated inflation rate of 6.2 percent for fiscal year 1977 was taken from projections in *The United States Budget in Brief, Fiscal Year 1977.* The GNP deflator includes the effects of price changes for all goods and services in the economy and therefore can only indicate approximate changes in costs of inputs specifically related to R&D performance.

[2] Office of Management and Budget, *Special Analyses, The Budget of the United States Government, Fiscal Year 1977,* "Special Analysis P: Research and Development Programs" (Washington, D.C.), 1976, p. 279.

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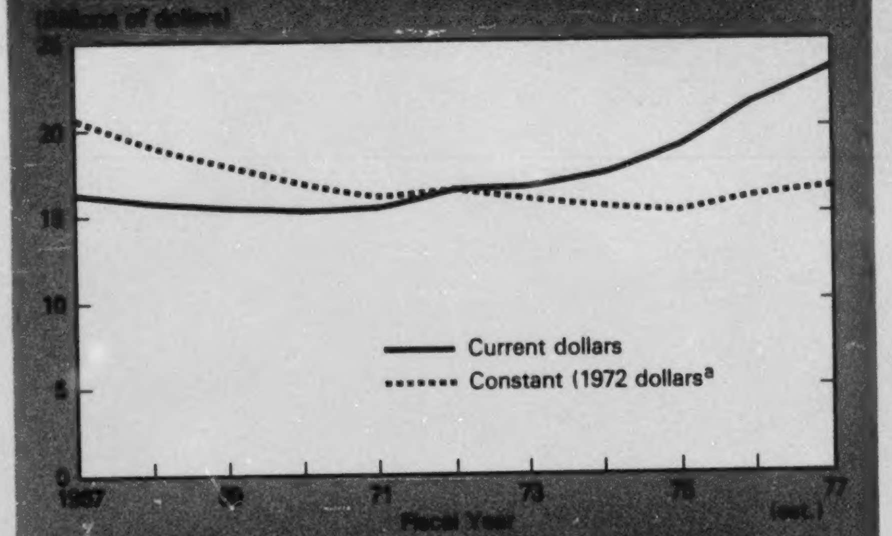
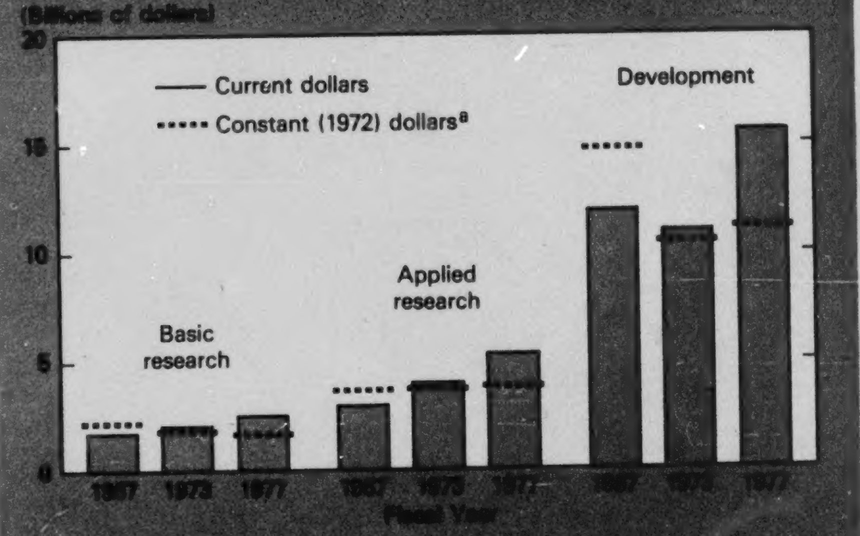
Trends in Federal R&D obligations



Federal R&D obligations by character of work: fiscal years 1967, 1973, and 1977 (est.)



[a]Based on GNP implicit price deflator.
SOURCE: National Science Foundation

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rformance.

s. *The Budget of the United States Gov-*
ch and Development Programs" (Wash-

Character of work	1967-75	1975-76	1976-77
Current dollars			
R&D total	1.8	13.5	8.6
Research	5.0	9.2	3.7
Basic research	2.7	9.3	7.4
Applied research	6.2	9.2	2.1
Development	.3	16.0	11.2
Constant dollars[1]			
R&D total	-3.8	6.4	2.2
Research	- .8	2.3	-2.4
Basic research	-2.9	2.4	1.1
Applied research	.3	2.3	-3.9
Development	-5.2	8.7	4.7

[1] Based on GNP implicit price deflator.

SOURCE: National Science Foundation

Agency Shifts

Pressures toward growth or decline in Federal R&D totals can be seen in the changes in R&D funding for specific agencies. In 1977 the five leading agencies in such support were the Department of Defense (DOD), the National Aeronautics and Space Administration (NASA), the Energy Research and Development Administration (ERDA), the Department of Health, Education, and Welfare (HEW), and the National Science Foundation (NSF). Of these, the high relative growth scheduled for the R&D efforts of DOD, ERDA, and NSF reflected the priorities of the overall budget. Defense, energy, and basic research were areas selected for budget increases in contrast with most other budget areas outside of domestic assistance programs.

The scheduled growth for DOD, ERDA, and NSF was well ahead of anticipated inflation whereas the scheduled rise for NASA was considerably less than inflation, and HEW showed an absolute-dollar decline. The remaining agencies, taken collectively, also showed an absolute decline for their overall R&D programs. The 1977 dollar increases planned for DOD and ERDA, in fact, accounted for almost the entire growth in total Federal R&D obligations in the President's budget.

Over the longer term a somewhat different pattern is seen. Between 1967 and 1977 the rate of growth for the R&D programs of DOD has not been sufficient to keep abreast of inflation; in real terms a 22-percent drop is shown in the 10-year period. As for NASA, an absolute decline in funding (despite a rise in the last three years) is found to amount to 59 percent in real terms. Growth for the Department of Transportation (DOT), the fifth-place agency in 1967, is translated into a decrease of 30 percent in constant dollars over the 1967-77 timespan. On the other hand, real long-term growth in that period is shown by HEW, whose R&D programs increased 24 percent in constant dollars; by ERDA, whose gain in constant dollars was 46 percent in the same timespan,[3] by NSF, whose growth was 54 percent, and by the remaining agencies, whose aggregate increase was 55 percent. In the 1967-77 period the only agencies that did not show real R&D growth were DOD, NASA, and DOT, and since the first two of these agencies have accounted for at least three-fifths of all Federal R&D funding in this time, and often more, they have had a strong influence on Federal R&D support levels.

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[3] Prior to 1974 AEC data were used.

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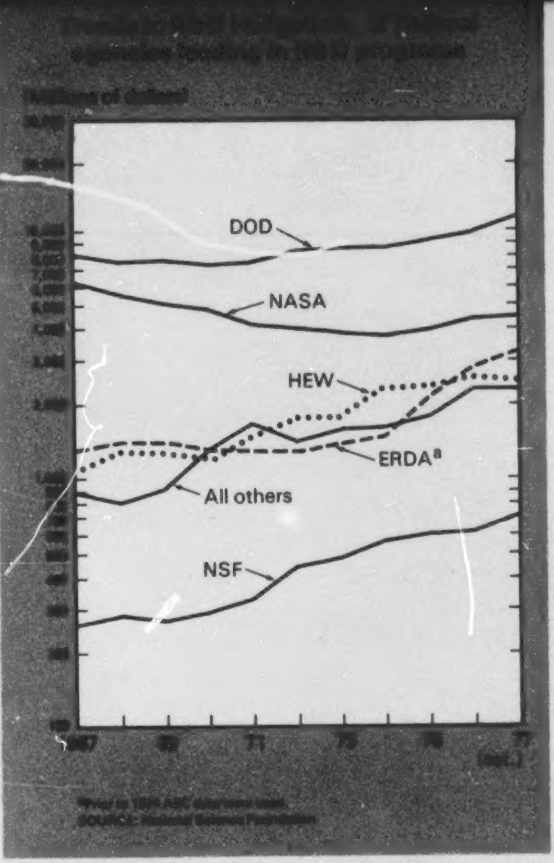

ᵃPrior to 1974 AEC data were used.
SOURCE: National Science Foundation

R&D Plant

Federal obligations for R&D plant were expected to grow from $821 million in 1975 to an estimated $888 million in 1976 and a scheduled $1.2 billion in 1977. In each of these years ERDA accounted for approximately one-half of the Federal R&D plant total and DOD and NASA were, respectively, second and third in support.

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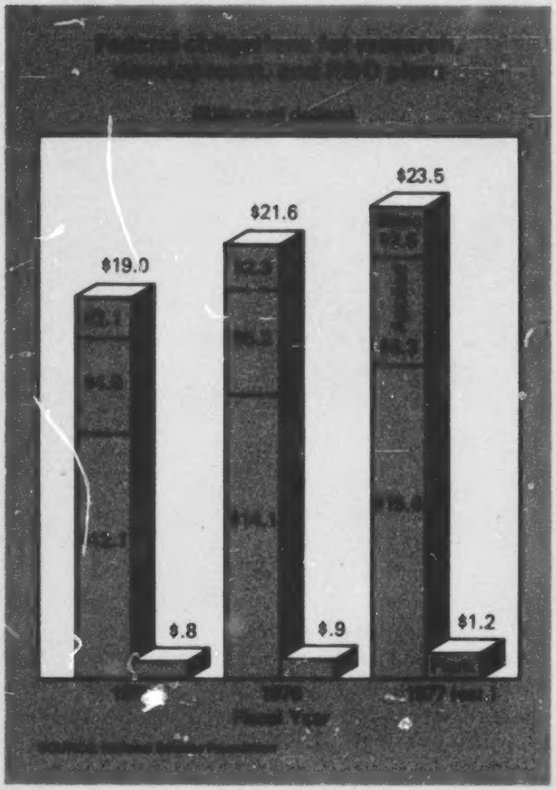
[3] Prior to 1974 AEC data were used.

Character of Work

In 1977 the estimated shares of the character of work components within the Federal R&D total are 11 percent for basic research, 23 percent for applied research, and 67 percent (rounded) for development.[4] The proportions have changed over the past decade toward a greater emphasis on research in relation to development; in 1967 the total research share (basic research plus applied research) was 28 percent and the development share, 72 percent.



In the past decade agencies other than DOD and NASA have, as a group, undertaken or expanded R&D programs much more rapidly than the two leading agencies, and their programs have been weighted more heavily toward research than development. In the current period, however, the tendency is for the development share to increase once again—from 64 percent in 1975 to more than 66 percent in 1977—as DOD and ERDA sponsor military and energy programs with larger development components.

Thus, although between 1967 and 1977 considerable declines are shown in real terms in funding for basic research and development, with almost no real change in the applied research level, the opposite trend is shown between 1975 and 1977. In this 2-year period the real estimated gain for development is 14 percent, for basic research, 4 percent, and for applied research, just under 2 percent.

Performers

The agency shifts just described have had a measurable effect on the use of R&D-performing sectors in the 1967-77 decade. Although all performers show growth in current dollars when 1967 is compared with 1977, considerable contrast in their use is revealed on a constant-dollar basis. For example, real Federal intramural performance in 1977 was scheduled at almost exactly the same level of effort as in 1967, but real industrial R&D performance was shown to have decreased by an estimated 33 percent in that period. The real federally supported R&D efforts of universities and colleges reveal an estimated 2-percent gain, 1977 versus 1967, although similar work of other nonprofit institutions has been diminished by 12 percent. FFRDC's[5] administered by universities have decreased their real federally funded R&D work by 1 percent.

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[4] A reclassification of many NASA research programs under development has resulted in lower overall Federal basic research and applied research totals and a larger share for development in all years. See technical notes for details, p. 58.

[5] Federally Funded Research and Development Centers.

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[Dollars in millions]

Fiscal Year	Total budget outlays[2]	Research, development, and R&D plant[1]		R&D-related outlays as percent of total budget outlays
		Obligations	Outlays	
1940	$9,589	(3)	$74	0.8
1941	13,980	(3)	198	1.4
1942	34,500	(3)	280	.8
1943	78,909	(3)	602	.8
1944	93,956	(3)	1,377	1.5
1945	95,184	(3)	1,591	1.7
1946	61,738	(3)	918	1.5
1947	36,931	$691	900	2.4
1948	36,493	868	855	2.3
1949	40,570	1,105	1,082	2.7
1950	43,147	1,175	1,083	2.5
1951	45,797	1,812	1,301	2.8
1952	67,962	2,195	1,816	2.7
1953	76,769	3,361	3,101	4.0
1954	70,890	3,039	3,148	4.4
1955	68,509	2,745	3,308	4.8
1956	70,460	3,267	3,446	4.9
1957	76,741	4,389	4,462	5.8
1958	82,575	4,906	4,991	6.0
1959	92,104	7,123	5,806	6.3
1960	92,223	8,080	7,744	8.4
1961	97,795	9,607	9,287	9.5
1962	106,813	11,069	10,387	9.7
1963	111,311	13,663	12,012	10.8
1964	118,584	15,324	14,707	12.4
1965	118,430	15,746	14,889	12.6
1966	134,652	16,179	16,018	11.9
1967	158,254	17,149	16,859	10.7
1968	178,833	16,525	17,049	9.5
1969	184,548	16,310	16,348	8.9
1970	196,588	15,865	15,736	8.0
1971	211,425	16,175	15,992	7.6
1972	231,876	17,114	16,743	7.2
1973	246,526	17,596	17,510	7.1
1974	268,392	18,205	18,326	6.8
1975	324,601	19,865	19,590	6.0
1976 (est)[4]	373,535	22,513	21,379	5.7
1977 (est)[4]	394,237	24,727	23,596	6.0

(1) Beginning in fiscal year 1953 amounts for both obligations and outlays include pay and allowance of military personnel in research and development. (2) "Outlays" include expenditures plus net lending. Data through fiscal year 1953 are in terms of the "Consolidated Cash Statement" and data beginning with fiscal year 1954 are in terms of the "Unified Budget." For purposes of providing trend information the data are considered to be reported on a generally comparable basis. (3) Not Available. (4) These estimates are based on amounts shown in *The Budget, 1977,* and do not reflect congressional appropriations or changes made by Executive action subsequent to budget submission at the midpoint of fiscal 1976. Sources: Office of Management and Budget and Bureau of the Budget, *The Budget of the United States Government,* fiscal years 1940 through 1977; National Science Foundation, annual surveys of R&D programs of Federal agencies.

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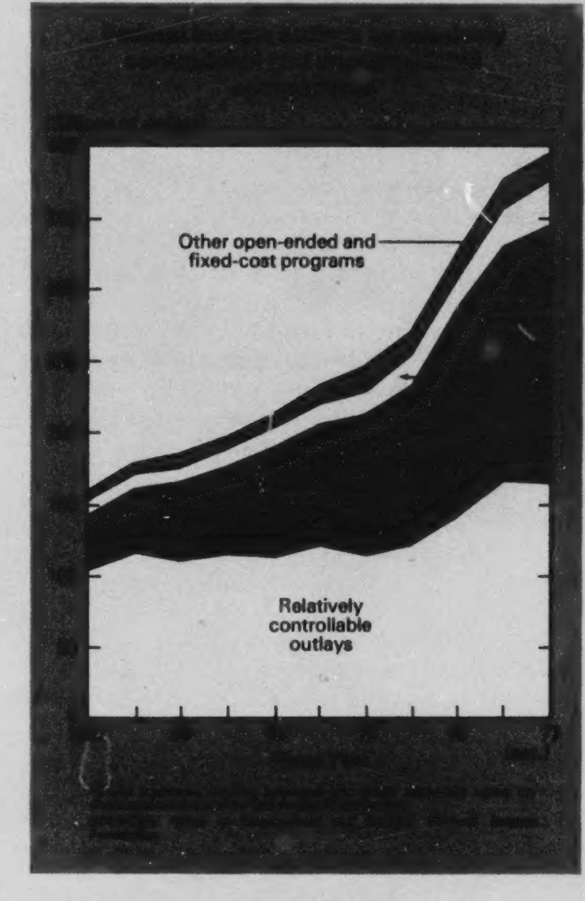
[5] Federally Funded Research and Development Centers.

Relationship to Total Budget

The share of R&D and R&D plant outlays in the total Federal budget showed marked growth between 1950 and 1960 when defense and atomic energy programs were in a strong buildup phase. In the late fifties and early sixties the rapid progress of the space program, initiated in 1958, added considerable weight to Federal R&D dollar totals and pushed their share within the overall budget to a high point of 12.6 percent in 1965. Since then, although funding levels for R&D programs have often risen from one year to the next, the direction of the overall budget has been steadily upward, with growth taking place at a faster pace than R&D outlays. Much of the budget increase of recent years has been generated by fixed cost and open-ended domestic programs. The share of R&D and R&D plant programs in the budget total by 1976 had thus fallen to an estimated 5.7 percent, although it was expected to rise to 6.0 percent in 1977—evidence of the continuing need for scientifically based mission support, whatever the prevailing budget stringencies.

A better indication of the importance ascribed to R&D programs can be found in changes in the ratio of these programs to the relatively controllable portion of the budget. Budget outlays for a large number of Federal programs cannot be controlled without changes in existing substantive law. These programs would include Federal benefit payments such as social security, medical insurance, and veterans benefits, interest payments, and payments for the legislative and judicial branches; they constitute in this analysis the relatively uncontrollable part of the budget. Other programs, including R&D and R&D plant programs, are subject to annual appropriation action and, thus, are relatively controllable.

Between 1967 and 1977 total Federal budget outlays rose from $158.3 billion to an estimated $394.2 billion, and within this total the relatively controllable part grew from $103.4 billion to an estimated $158.1 billion. As a share of these relatively controllable outlays R&D-related outlays were at a high point of 16.3 percent in 1967 and thereafter fell to somewhat lower levels, fluctuating from year to year. They reached a low point of 13.7 percent in 1970 and an interim high point of 15.1 percent in 1973 and 1974, then fell in 1975 to 13.8 percent and in 1976 to an estimated 13.5 percent. The estimated ratio for 1977, however, was 14.9 percent. Very rapid budget growth in 1975 and 1976, which affected relatively controllable outlays as well as the uncontrollable portion, produced the reduced R&D ratios for those years.



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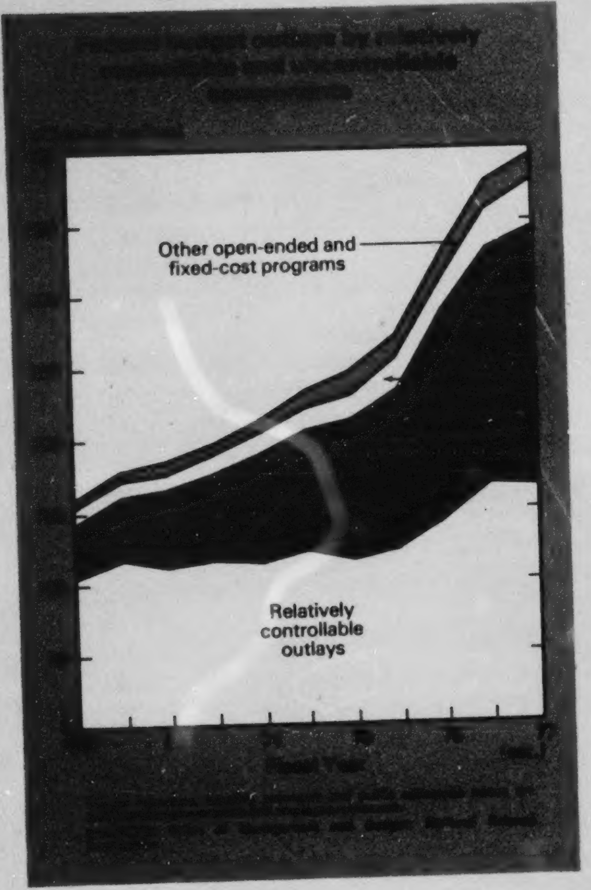


controllable Federal outlays:[1] FY 1967-77

[Dollars in billions]

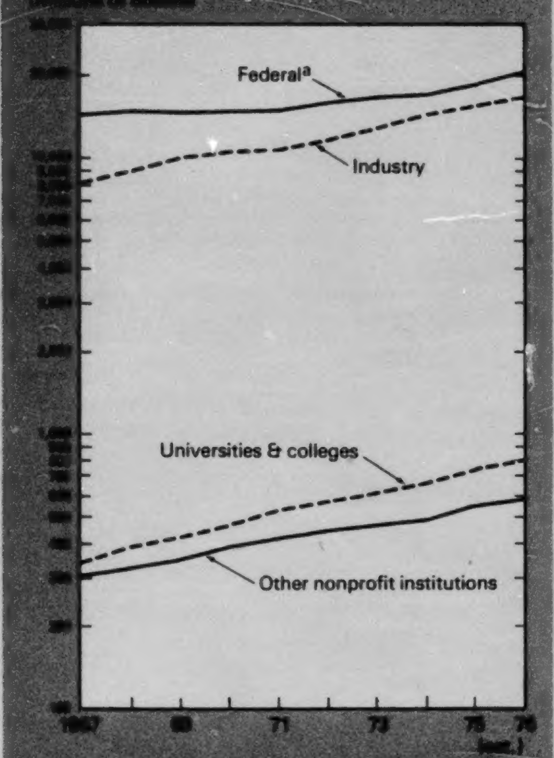
Fiscal year	Relatively controllable outlays	R&D and R&D plant outlays	R&D and R&D plant outlays as percent of relatively controllable outlays
1967.	$103.4	$16.9	16.3
1968.	115.6	17.0	14.7
1969.	112.0	16.3	14.6
1970.	114.8	15.7	13.7
1971.	113.9	16.0	14.0
1972.	120.4	16.7	13.9
1973.	115.9	17.5	15.1
1974.	120.9	18.3	15.1
1975.	141.9	19.6	13.8
1976 (est.)	158.3	21.4	13.5
1977 (est.)	158.1	23.6	14.9

[1] The NSF definition of relatively controllable outlays differs from that of OMB in that OMB considers outlays from prior-year contracts and obligations as relatively uncontrollable whereas NSF considers such outlays to be initially controllable and therefore different in concept from fixed-cost and open-ended programs like social security, veterans compensation and pensions, and interest on the national debt. A change in the disbursement of the latter class of funds requires a change in existing substantive law, but funding in all other areas is based on congressional appropriations and is in that sense relatively controllable. R&D programs fall within this relatively controllable category of Federal programs. See Office of Management and Budget, *The Budget of the United States Government, Fiscal Year 1977* (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office), pp. 354-55.

Relationship to the National R&D Total

Within the national R&D expenditure total the Federal Government has continued to be the major source of funds. The share of Federal support, however, dropped steadily from 62 percent in 1967 to [illegible] percent in [illegible]. The estimates for 1975 and 1976 (latest available year) show the Federal share at almost 53 percent, a slight increase. A significant trend is the steady upward rise in national R&D funding from $23.2 billion in 1967 to an estimated $38.1 billion in 1976. During this period the industrial, university-and-college, and other nonprofit sectors all increased R&D support each year in contrast to Federal funding, which fluctuated narrowly from 1967 through 1971, but showed annual growth thereafter.

Trends in national R&D expenditures by source



[a] [illegible]

SOURCE: National Science Foundation

During the 1967-76 period industry provided the second largest share of national R&D funds, moving from 35 percent of the national total in 1967 to an estimated 43 percent in 1976. The shares in funding of universities and colleges and other nonprofit institutions grew slightly in the same period but still formed very small proportions of overall support.

By contrast, the pattern of R&D *performance* by sectors showed little change. In 1967, for example, industry performed 71 percent of the total national effort and in 1976 was expected to perform 70 percent. The Federal Government reflected shares of 15 percent for each of the same years. Only the university-and-college sector could claim a significant relative change; performance by this sector increased from 8 percent of the national total in 1967 to an estimated 10 percent in 1976.

Relationship to GNP

As a broad indication of the relative importance of R&D investment within the national economy, ratios of R&D expenditures to the gross national product (GNP) have been calculated over a timespan. In 1967 the overall R&D/GNP ratio was 2.9 percent and since then the ratio has

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[6] See National Science Foundation, *National Patterns of R&D Resources: Funds & Manpower in the United States, 1953-1976* (NSF 76-310) (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office, 1976).

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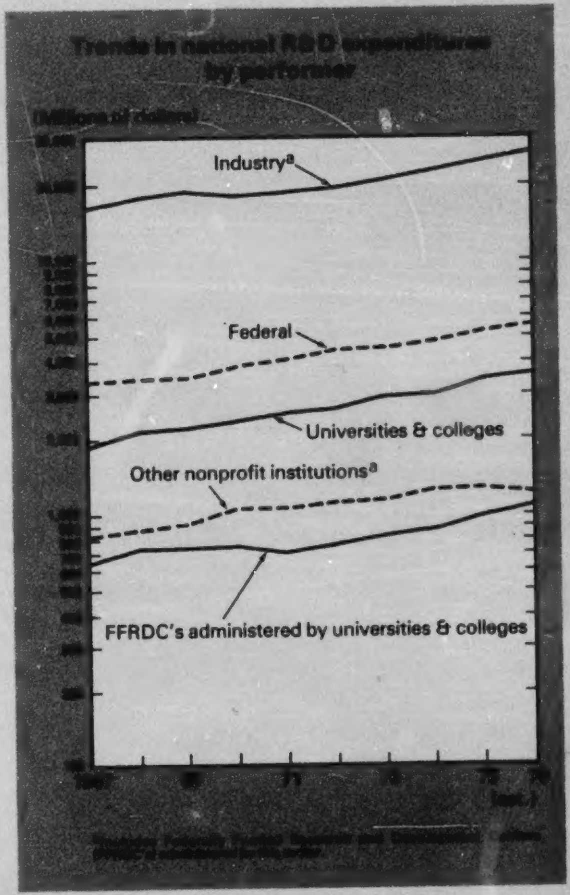
During the same period the share of the Federal R&D effort in the GNP total declined from 1.8 percent to an estimated 1.1 percent. From 1967 to 1974 the Federal R&D/GNP ratio fell more rapidly than the overall R&D/GNP ratio, but in 1975 a slight increase was shown, then a leveling off in 1976. The indicated drop for 1977 is somewhat less than the indicated decrease for the overall R&D/GNP ratio.



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- In 1977 the 10 leading agencies in R&D support are expected to account for an estimated 98 percent of the Federal R&D total, just slightly less than in 1967. But the four largest agencies—DOD, NASA, ERDA, and HEW—are expected to represent 88 percent of this total compared with 93 percent in 1967, evidence that a greater number of agencies are supporting significant R&D programs.

Current Programs

- In 1977 DOD is scheduled for growth of $1,320 million, which represents more than two-thirds of the increase for Federal R&D funding as a whole. This agency will account for an estimated 48 percent of the Federal R&D total in 1977, compared with 49 percent in 1967.

R&D programs administered by the Air Force represent an estimated 37 percent of the total DOD effort in 1977. Next in size are Navy programs, scheduled for 35 percent of the DOD total, followed by the Army, with 22 percent and the Defense Agencies, with 6 percent.

The Navy is scheduled for the largest increase in 1977. A 17-percent growth, almost one-half of the overall DOD increase, is largely attributed to the F-18 air combat fighter, the CSEDS test site, the LAMPS helicopter, and the sea-launched cruise missile. Increases are scheduled for continuing work on the fleet ballistic missile system and undersea warfare technology. The Trident submarine-launched missile system is still a major naval program, but funding is considerably reduced as the program moves into the procurement stage.

The Army shows the next largest increase in 1977. A scheduled rise of 17 percent, almost one-fourth of the overall DOD increase, is chiefly related to such expanding programs as the AAH advanced attack helicopter, the XM-1 tank system, and the cannon-launched guided projectile (CLGP). Other growing programs are the Roland II short-range defense system, the Pershing II nuclear strike missile, the ballistic mis
gram, and the BMD advanced technolo
helicopter, still accounting for substanti
opment effort as the procurement stage

The 8-percent increase for the Air Force,
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4, advanced airborne command post, the
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Federal obligations for research

[Dollars in m

Agency	Actual
	1975
Total	$19,044
Department of Defense	9,012
National Aeronautics and Space Administration	3,064
Energy Research and Development Administration	2,072
Department of Health, Education, and Welfare	2,375
National Science Foundation	595
Department of Agriculture	420
Department of Transportation	312
Department of the Interior	281
Environmental Protection Agency	258
Department of Commerce	215
Other agencies	440

Source: National Science Foundation

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nuclear strike missile, the ballistic missile defense system technology program, and the BMD advanced technology program. The UTTAS transport helicopter, still accounting for substantial funds, shows a decrease in development effort as the procurement stage begins.

The 8-percent increase for the Air Force, approximately one-fifth of the overall DOD increase, is primarily derived from the F-16 air combat fighter, the E-4, advanced airborne command post, the M-X intercontinental ballistic missile system, the air-launched cruise missile, and the SAM-D air-surface missile with a nuclear warhead. Funds are reduced for the B-1 advanced strategic bomber, scheduled to leave the development stage.

Federal obligations for research and development, by agency

[Dollars in millions]

Agency	Actual	Estimates			
	1975	1976	Percent change 1975-76	1977	Percent change 1976-77
Total	$19,044	$21,625	+13.5	$23,488	+ 8.6
Department of Defense	9,012	9,905	+ 9.9	11,225	+13.3
National Aeronautics and Space Administration	3,064	3,448	+12.5	3,547	+ 2.9
Energy Research and Development Administration	2,072	2,804	+35.3	3,280	+17.0
Department of Health, Education, and Welfare	2,375	2,603	+ 9.6	2,538	- 2.5
National Science Foundation	595	623	+ 4.7	718	+15.2
Department of Agriculture	420	478	+13.9	503	+ 5.1
Department of Transportation	312	372	+19.5	352	- 5.5
Department of the Interior	281	330	+17.5	313	- 5.2
Environmental Protection Agency	258	312	+21.0	246	-20.9
Department of Commerce	215	239	+10.9	235	- 1.4
Other agencies	440	511	+16.1	531	+ 3.9

Source: National Science Foundation

est R&D support agency. NASA will account for an estimated 15 percent of the Federal R&D total in 1977. The most important dollar increase is scheduled for the space shuttle program, which accounts for more than one-third of all NASA R&D support. Funding will also grow significantly for space applications programs such as earth resources, ocean condition, and environmental quality monitoring. Lunar and planetary exploration does not reflect an increase but still accounts for a substantial portion of the funds for ongoing programs, among which the Viking, Pioneer, and Helios missions are prominent. Aeronautical research and technology is scheduled for a rise, as is tracking and data acquisition.

- The R&D programs of ERDA are expected to grow by $476 million in 1977, the equivalent of one-fourth of the total Federal R&D gain. The share of ERDA among all agencies is an estimated 14 percent. Since 1974 ERDA has expanded rapidly as a result of the consolidation of most energy programs under this new agency, the high cost of performing energy R&D work, and the increasing size of most of the programs.

- Fission power reactor development, which accounts for almost one-fifth of the ERDA effort, is scheduled for the greatest dollar increase for work on such projects as the liquid metal fast breeder reactor (LMFBR) and the water cooled breeder reactor. The second largest ERDA program, weapons R&D and testing, also accounting for nearly one-fifth of ERDA R&D support, shows a substantial increase. Funds are more than doubled in 1977 for fuel cycle R&D efforts, which include uranium resources assessment, reprocessing and recycling of recovered radioactive elements, and isolation and storage of nuclear wastes. Support will also increase significantly for magnetic fusion research. Special facilities to support reactor safety research are provided for in the plans for 1977.[7] Fossil energy development, the chief growth area in 1976, is scheduled for a decrease in 1977 as experimentally designed coal processing pilot plants near completion. An important dollar increase is planned, however, for solar energy development and another increase for geothermal energy development. Growing conservation efforts are focused on end-use conservation and electrical energy systems.

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[7] These are considered to be expendable equipment and therefore are not part of R&D plant.

Even so, HEW will still account f
Federal R&D total. The large d
Health (NIH), especially the Nati
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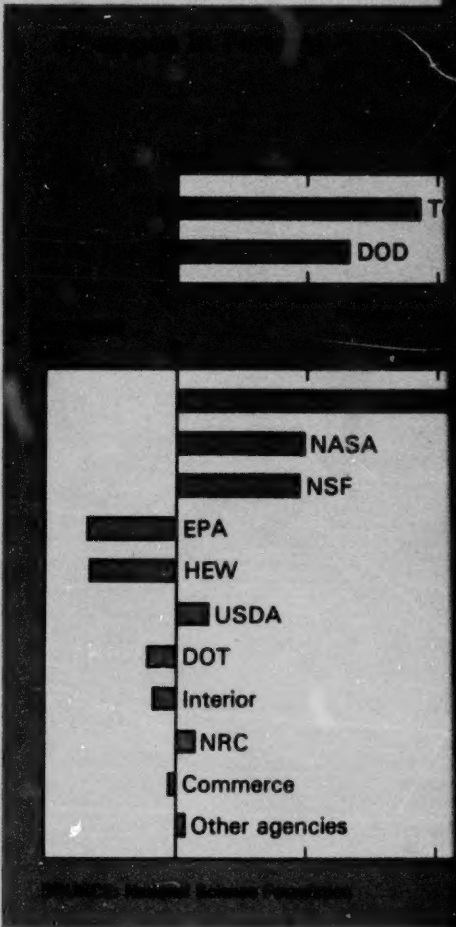

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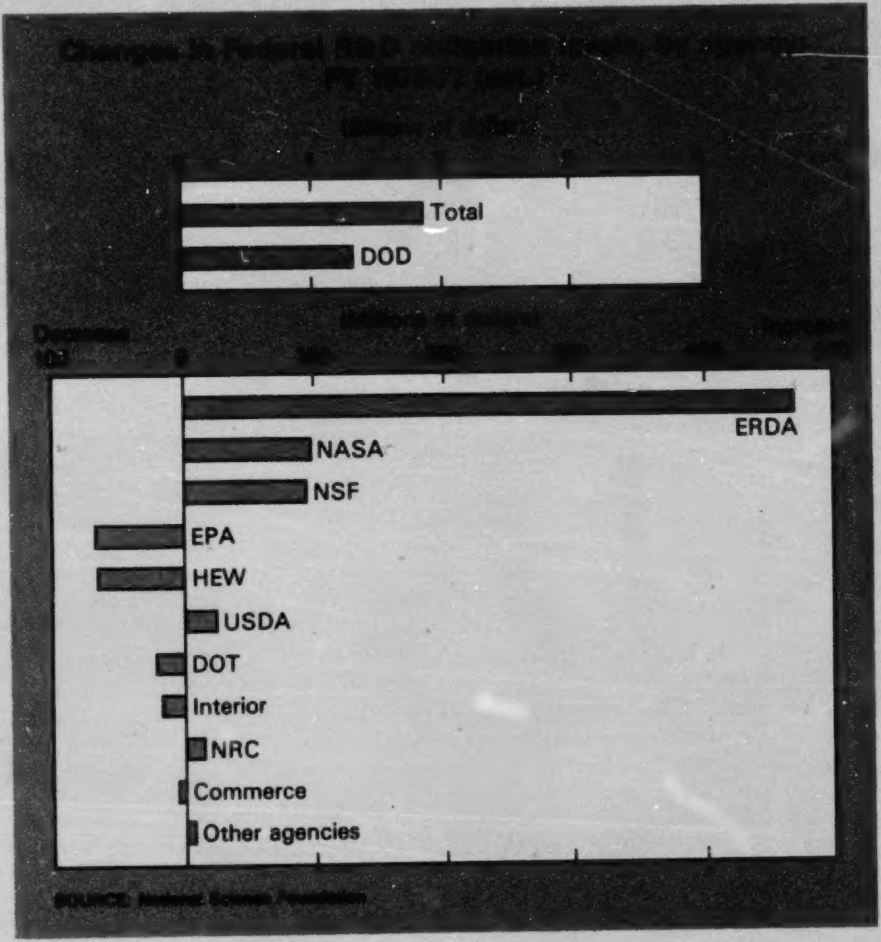
to grow by $476 million in
total Federal R&D gain. The
mated 14 percent. Since 1974
of the consolidation of most
the high cost of performing
of most of the programs.

accounts for almost one-fifth
atest dollar increase for work
eder reactor (LMFBR) and the
largest ERDA program, wea-
nearly one-fifth of ERDA R&D
ds are more than doubled in
de uranium resources assess-
red radioactive elements, and
upport will also increase sig-
Special facilities to support
n the plans for 1977.[7] Fossil
a in 1976, is scheduled for a
d coal processing pilot plants
ease is planned, however, for
crease for geothermal energy
s are focused on end-use con-

Even so, HEW will still account for an estimated 11-percent share of the Federal R&D total. The large decrease for the National Institutes of Health (NIH), especially the National Cancer Institute, and decreases for health-related programs of other HEW subdivisions more than offset increases for the National Institute of Education (NIE) and the Office of Education (OE). The reason for the decreases is that Congress took final action on the HEW 1976 appropriation after submission of the President's 1977 budget in January. This resulted in a 1976 R&D increase of $234 million for HEW, primarily NIH, over the total estimated for 1976 in the budget message, making it higher than the 1977 budget request.

Changes in Federal R&D [illegible]



SOURCE: National Science Foundation

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therefore are not part of R&D plant.

- In 1977 NSF is expected to increase R&D support by $94 million, and NSF programs will account for 3 percent of the Federal R&D total. Increases include research project support in all the science disciplines—especially physics, and physiology, cellular and molecular biology, and engineering. An important increase is also scheduled for the U.S. Antarctic research program. The RANN (Research Applied to National Needs) program reflects a decrease mainly resulting from the transfer of energy research programs to ERDA and the transfer of fire research to the National Fire Prevention and Control Administration within the Department of Commerce.

- For USDA, a $24 million increase is anticipated that will bring the share of this agency to 2 percent of the Federal R&D total in 1977. Most of the growth is found in research on plant production and on soil, water, and air of the Agricultural Research Service and payments by the Cooperative State Research Service for research performed at agricultural experiment stations in all 50 States. Research on animal production, which accounts for a significant portion of the funds, reflects a slight increase in 1977.

- The Department of Transportation (DOT), after an increase in 1976, is scheduled for a $21 million decrease in 1977. This net decline is largely brought about by decreases in Federal Railroad Administration and in Federal Highway Administration research programs that are not offset by increases in other programs. The chief impetus towards expansion is found in the Urban Mass Transportation Administration for work on the advanced concept train and low-polluting paratransit vehicles, and for testing an automated shuttle and loop transit system. Another increase is shown by the Federal Aviation Administration (FAA) for work on air traffic control to enhance safety and airport and airway capacity.

- The Department of the Interior is another agency that showed an increase in 1976 but reflects a decrease in 1977—in this case, $17 million. Much of the decrease is reflected in mining technology and metallurgy research programs of the Bureau of
the U.S. Fish and Wildlife Service a
Technology. The Geological Survey
ing level after an increase in 1976, la
investigations, offshore geologic sur

- A decrease of $65 million is expecte
mental Protection Agency (EPA) th
1975 level. The net decline is attribu
of energy-related environmental as
funding of certain aspects of the air

- The overall R&D effort of the Depar
decrease in 1977. Although the N
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not compensate for the lower fundi
opment Administration and the Ma
increase is chiefly influenced by R
tinued availability of safe fishery p
and managing our living marine res

- An additional 25 agencies reported
budget period. In 1977 these are exp
percent of the Federal R&D total. T
estimated increase of $20 million. A
terms of R&D program effort are t
(NRC), the Veterans Administratio
and Urban Development (HUD), and
a 13-percent increase is planned in 1
over reactor safety research, enviro
safety research. Although VA medi
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HUD is expected to increase its pro
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research programs of the Bureau of Mines. Slight increases are shown for the U.S. Fish and Wildlife Service and the Office of Water Research and Technology. The Geological Survey will show a decline to the 1975 funding level after an increase in 1976, largely because of reduced geothermal investigations, offshore geologic surveys, and other geological research.

- A decrease of $65 million is expected for R&D programs of the Environmental Protection Agency (EPA) that will bring total support below the 1975 level. The net decline is attributable to the completion of a number of energy-related environmental assessment programs and to reduced funding of certain aspects of the air quality and water quality programs.

- The overall R&D effort of the Department of Commerce reflects a slight decrease in 1977. Although the National Oceanic and Atmospheric Administration (NOAA) program is scheduled for an increase, this does not compensate for the lower funding planned for the Economic Development Administration and the Maritime Administration. The NOAA increase is chiefly influenced by R&D efforts aimed at assuring continued availability of safe fishery products, and protecting, developing, and managing our living marine resources.

- An additional 25 agencies reported R&D program data for the 1975-77 budget period. In 1977 these are expected to account for approximately 2 percent of the Federal R&D total. Taken collectively, they represent an estimated increase of $20 million. Among these agencies, the largest in terms of R&D program effort are the Nuclear Regulatory Commission (NRC), the Veterans Administration (VA), the Department of Housing and Urban Development (HUD), and the Department of Justice. For NRC, a 13-percent increase is planned in 1977 that will be chiefly distributed over reactor safety research, environmental and fuel cycle research, and safety research. Although VA medical and prosthetic research and Justice drug and law enforcement programs are scheduled for decreases, HUD is expected to increase its programs in housing and neighborhood and community research by 14 percent.

Most of the R&D work financed by the Federal Government is performed outside the Federal establishment. In 1977 it is estimated that $17.4 billion—or 74 percent of all Federal R&D obligations—will be directed in the form of contracts and grants to extramural performers. The remaining R&D total of $6.1 billion, or 26 percent, will be used to support intramural performance or work by Federal personnel.

INDUSTRY

In 1977 industrial firms (including FFRDC's) account for an estimated 52 percent of Federal R&D performance, an increase of 2 percentage points above 1976. Even though industrial firms have remained the leading performer, the level of dollar awards to this sector has only recently begun to move upward after a lengthy period of decline. The industrial share of the total—62 percent in 1967—dropped to 48 percent by 1975.

Recent growth is attributed to rising contract awards on the part of DOD, NASA, and ERDA, the three leading support agencies. DOD is expected to account for approximately 61 percent of the industry total in 1977, while NASA, accounting for 20 percent in 1975, will drop to an estimated 17 percent in 1977. ERDA, showing by far the largest relative increase in the three current years, will increase support from a 13-percent share to an estimated 17-percent share between 1975 and 1977.

In 1977 an estimated 86 percent of the support to industrial firms is directed to development, 13 percent to applied research, and only 1 percent to basic research.

INTRAMURAL

The Federal intramural sector has reflected a continuous absolute increase in R&D funding since 1967, and has moved from a 21-percent share of the Federal R&D total in 1967 to a 26-percent share in 1977. The share in 1976 was 1 percentage point higher. Federal intramural performance covers costs associated with the administration of extramural programs by Federal personnel as well as costs associated with direct performance.

DOD is expected to provide slightl
1977, while NASA, the second suppo
20 percent. HEW remains the third a
though an actual dollar decrease is sc
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decreases in 1977, namely HEW, Inte

Federal obligations for

[Dollars

	Actual
Performer	1975
Total	$19,044
Federal intramural	5,395
Industrial firms	8,385
FFRDC's[1] adm. by industrial firms	729
Universities and colleges	2,403
FFRDC's[1] administered by universities	935
Other nonprofit institutions	718
FFRDC's[1] administered by non-profit institutions	220
State and local governments	198
Foreign performers	62

[1] Federally Funded Research and Development Ce

Source: National Science Foundation

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—will be directed in the form of
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in 1977. The share in 1976 was 1
performance covers costs asso-
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rmance.

DOD is expected to provide slightly more than one-half of the support in 1977, while NASA, the second support agency, will account for an estimated 20 percent. HEW remains the third agency with 8 percent of the total, even though an actual dollar decrease is scheduled for HEW in 1977. An estimated 56 percent of the support to intramural performance in 1977 will be directed towards development, 32 percent towards applied research, and 12 percent towards basic research.

In each year of the 1967-77 decade DOD has provided more than one-half of the support for intramural performance and is largely responsible for the rising trend in overall support to this sector. NASA, the second largest support agency, has also contributed to this rise. Other agencies have played an important part in the expansion of the intramural sector, especially HEW, USDA, Interior, and Commerce. The level of support of each of these agencies is much higher than the 1967 level even though several of them will reflect decreases in 1977, namely HEW, Interior, and Commerce.

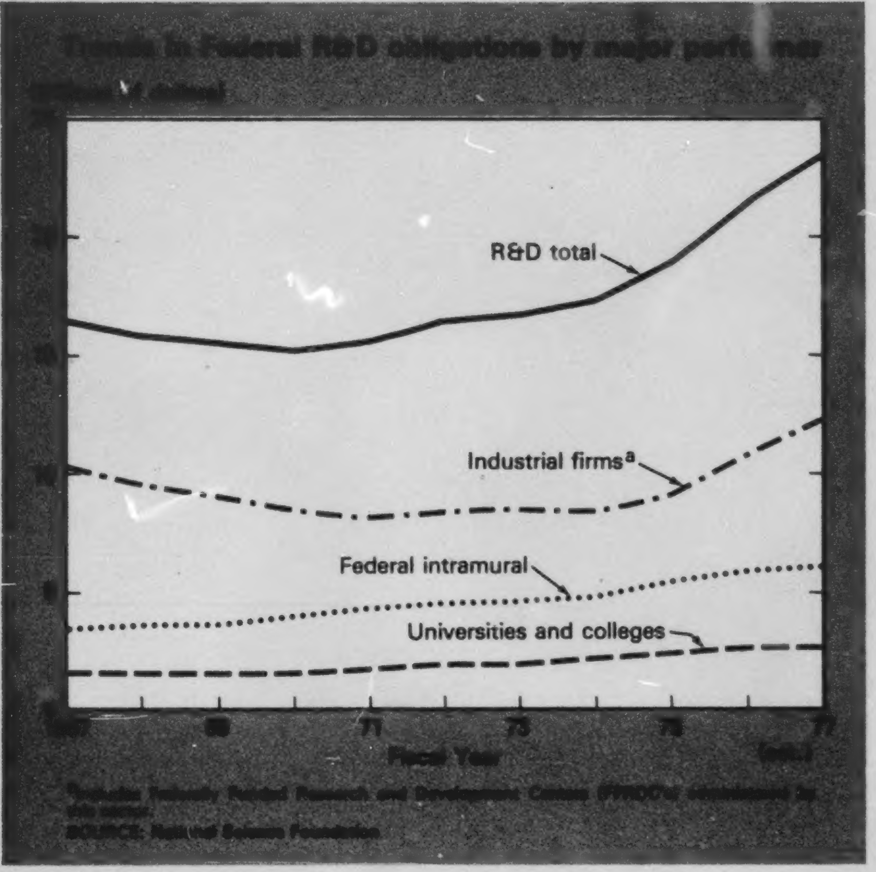
Federal obligations for research and development, by performer

[Dollars in millions]

Performer	Actual	Estimates			
	1975	1976	Percent change 1975-76	1977	Percent change 1976-77
Total	$19,044	$21,625	+13.5	$23,488	+ 8.6
Federal intramural	5,395	5,923	+ 9.8	6,060	+ 2.3
Industrial firms	8,385	9,917	+18.3	11,347	+14.4
FFRDC's[1] adm. by industrial firms	729	859	+17.9	961	+11.8
Universities and colleges	2,403	2,569	+ 6.9	2,643	+ 2.9
FFRDC's[1] administered by universities	935	1,065	+13.9	1,175	+10.4
Other nonprofit institutions	718	743	+ 3.5	707	- 4.9
FFRDC's[1] administered by nonprofit institutions	220	230	+ 4.6	267	+16.1
State and local governments	198	235	+18.4	247	+ 5.1
Foreign performers	62	83	+35.4	81	- 3.5

[1] Federally Funded Research and Development Centers.

Source: National Science Foundation



Trends in Federal R&D obligations by major performer

[a] Includes Federally Funded Research and Development Centers (FFRDC's) administered by this sector.

SOURCE: National Science Foundation

Federal support to universities and shown an almost unbroken rise from $1. billion in 1977 (the only drop occurring verted to constant dollars, however, the i 1977, with a 3-percent decrease shown universities and colleges accounts for an eral R&D total, and accounted for 12 pe cent in 1967.

Although reflecting a slight decrease i support agency, accounting for an estim with a 43-percent share in 1967. NSF increase funding to this sector, with m basic research. NSF will make up an est port total in 1977, compared with 14 pe

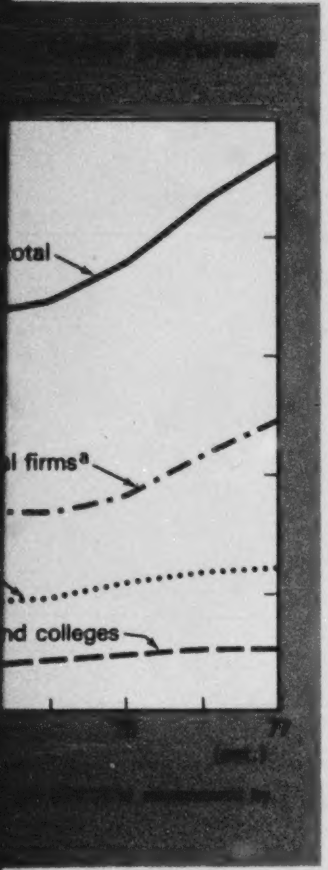
Increased dollar support is also expect the NASA level is not expected to chang percent of the total R&D funds to unive research efforts—47 percent for basic research.

Research by Fiel

Six agencies submitted program data and colleges by field of science. These ERDA, and NASA—make up 95 percent to universities and colleges in the curren bined support in 1977 is an estimated $

An estimated 56 percent of this resea the life sciences. The physical sciences total in 1977, with greatest emphasis Engineering will account for an estimat 8 percent; and social sciences for 5 perce accounts for 3 percent. All of these fie except for the life sciences and psychol is derived mostly from the clinical medi

HEW provides most of of the suppor and the HEW (primarily NIH) drop in 1 decreased support to these fields. NSF f mental sciences and is also the largest DOD and NSF combined provide over t matics and engineering. The social scie HEW, NSF, and USDA.



Federal support to universities and colleges (excluding FFRDC's) has shown an almost unbroken rise from $1.5 billion in 1967 to an estimated $2.6 billion in 1977 (the only drop occurring in 1970). When these totals are converted to constant dollars, however, the increase is only 2 percent from 1967 to 1977, with a 3-percent decrease shown between 1976 and 1977. Support to universities and colleges accounts for an estimated 11 percent of the 1977 Federal R&D total, and accounted for 12 percent in 1976, compared with 9 percent in 1967.

Although reflecting a slight decrease in 1977, HEW will remain the leading support agency, accounting for an estimated 50 percent of the total, compared with a 43-percent share in 1967. NSF, the second agency, is expected to increase funding to this sector, with most of the increase directed towards basic research. NSF will make up an estimated 20 percent of the Federal support total in 1977, compared with 14 percent in 1967.

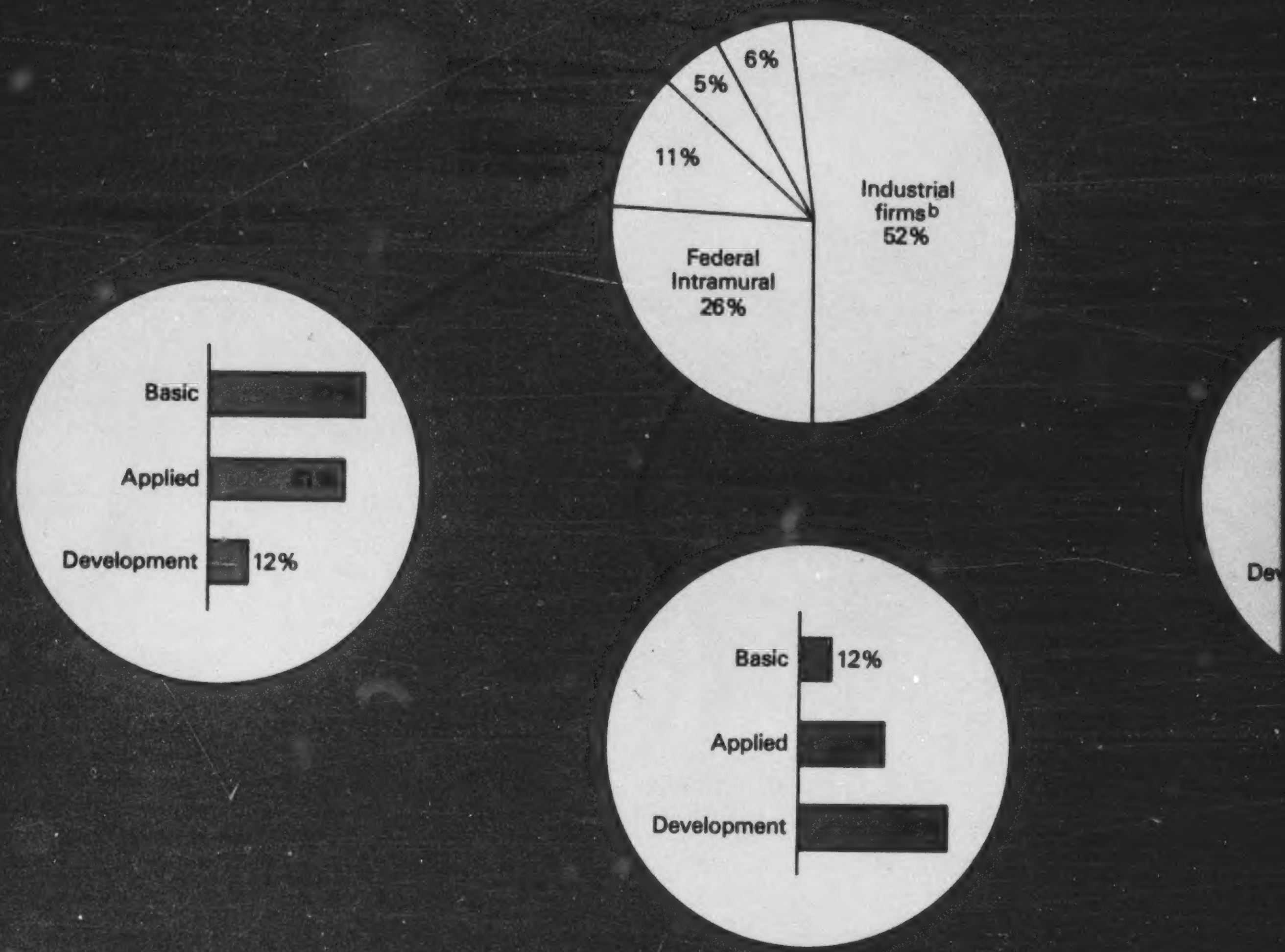
Increased dollar support is also expected from DOD, USDA, and ERDA, but the NASA level is not expected to change from 1976. In 1977 an estimated 88 percent of the total R&D funds to universities and colleges will be used for research efforts—47 percent for basic research and 41 percent for applied research.

Research by Fields of Science

Six agencies submitted program data on research performed at universities and colleges by field of science. These agencies—HEW, DOD, USDA, NSF, ERDA, and NASA—make up 95 percent of the total Federal research support to universities and colleges in the current (1975-77) budget period. Their combined support in 1977 is an estimated $2.2 billion.

An estimated 56 percent of this research total is expected to be directed to the life sciences. The physical sciences represent 14 percent of the research total in 1977, with greatest emphasis shown for physics and chemistry. Engineering will account for an estimated 9 percent; environmental sciences, 8 percent; and social sciences for 5 percent. Mathematics and psychology each accounts for 3 percent. All of these fields show growth in 1977 over 1976 except for the life sciences and psychology. The decrease for the life sciences is derived mostly from the clinical medical area.

HEW provides most of of the support to the life sciences and psychology, and the HEW (primarily NIH) drop in 1977 (explained earlier) is the cause of decreased support to these fields. NSF furnishes most support to the environmental sciences and is also the largest contributor to the physical sciences. DOD and NSF combined provide over three-fourths of the support to mathematics and engineering. The social sciences research is chiefly sponsored by HEW, NSF, and USDA.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Industrial firms b 52%
Federal Intramural 26%
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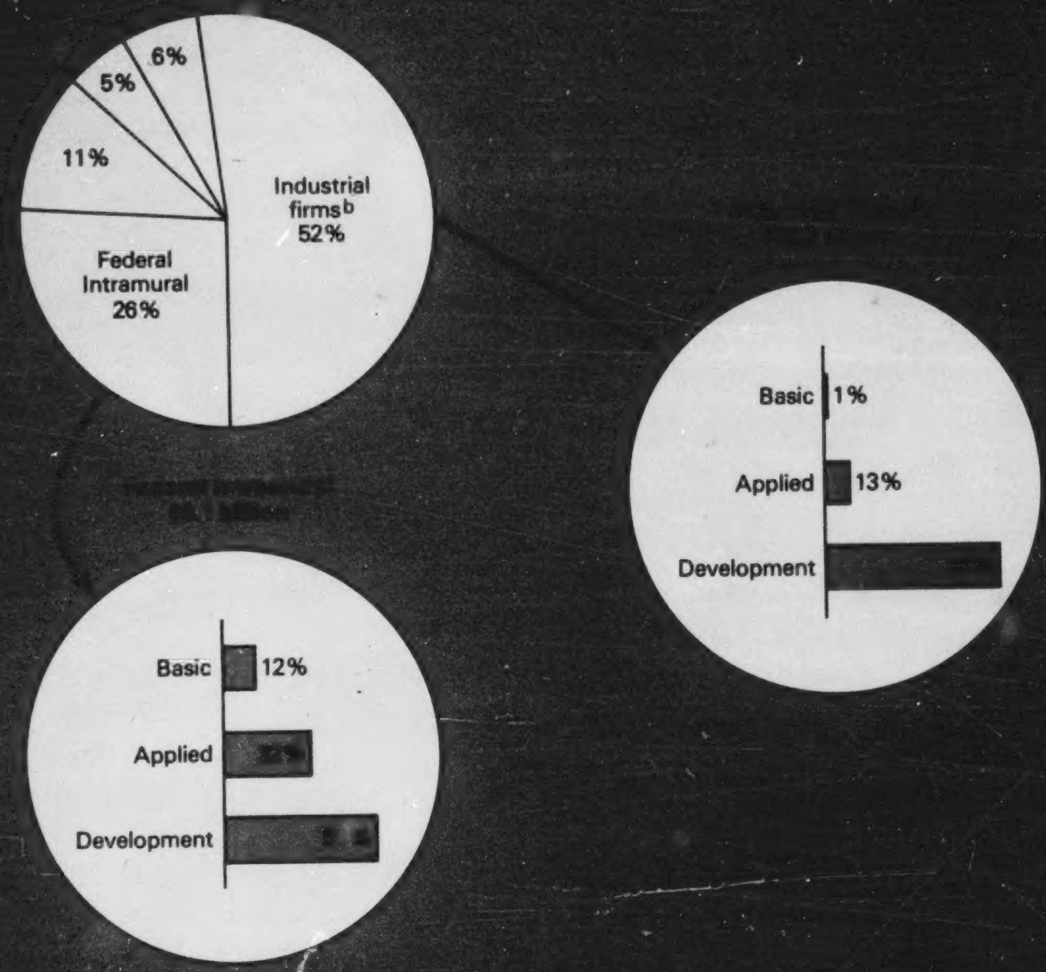
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Industrial firms^b 52%
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OTHER NONPROFIT

In 1977 Federal support to other nonprofit institutions (including FFRDC's) is expected to increase slightly in actual dollars but to decrease to 4 percent of the Federal R&D total, compared with 5 percent in 1976. Almost one-half of these funds will be directed to development work and nearly two-fifths to applied research. HEW is scheduled to contribute the largest share of support, 39 percent, but shows a dollar decrease in 1977. DOD, the second leading support agency, plans an increase.

STATE AND LOCAL GOVERNMENTS

State and local governments are expected to increase their R&D efforts slightly in 1977, but they still account for only 1 percent of the Federal R&D total. HEW is expected to provide three-fifths of the support in 1977. Most work performed by this sector is directed to development and very little to basic research.

FFRDC's

Federally Funded Research and Development Centers (FFRDC's) are R&D-performing or -managing organizations exclusively or substantially financed by one or more Federal agencies and administered for them by industrial firms, universities, or other nonprofit institutions. Six Federal agencies currently sponsor 39 FFRDC's. In 1976 and 1977, 49 percent of the aggregate agency support is expected to be directed to FFRDC's administered by universities and 40 percent to those administe
principal source of support for FFRDC's,
the total in 1977, followed by DOD with
NASA with 3 percent.

In the 1967-77 decade support to FFR
sharpest increase has been realized by
growing at almost twice the rate of FF
FFRDC's administered by universities,
the largest amount of support.

Federal R&D obligations to FFRDC's[1] by
FY 1977 (e

[Dollars in mil

Sector	All agencies	ERDA
Total	$2,403.7	$1,766.9
Industrial firms	961.1	851.7
Universities and colleges. . .	1,175.4	854.0
Other nonprofit institutions	267.2	61.2

[1] Federally Funded Research and Development Centers.

[2] Less than $50,000.

Source: National Science Foundation

itions (including FFRDC's) it to decrease to 4 percent of n 1976. Almost one-half of nd nearly two-fifths to ap- largest share of support, 39 the second leading support

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ncrease their R&D efforts percent of the Federal R&D the support in 1977. Most lopment and very little to

enters (FFRDC's) are R&D- y or substantially financed red for them by industrial . Six Federal agencies cur- 9 percent of the aggregate C's administered by universities and 40 percent to those administered by industrial firms. ERDA is the principal source of support for FFRDC's, providing an estimated 74 percent of the total in 1977, followed by DOD with 14 percent, NRC with 4 percent, and NASA with 3 percent.

In the 1967-77 decade support to FFRDC's has risen almost steadily. The sharpest increase has been realized by FFRDC's administered by industry, growing at almost twice the rate of FFRDC's administered by universities. FFRDC's administered by universities, however, have always accounted for the largest amount of support.

Federal R&D obligations to FFRDC's[1] by administering sector and agency: FY 1977 (est.)

[Dollars in millions]

Sector	All agencies	ERDA	DOD	NRC	NASA	NSF	HEW	Other
Total	$2,403.7	$1,766.9	$337.6	$98.1	$80.8	$52.0	$36.8	$31.5
Industrial firms	961.1	851.7	.5	79.3	(2)	1.8	27.3	.5
Universities and colleges. . .	1,175.4	854.0	171.4	15.2	79.2	47.9	4.6	3.1
Other nonprofit institutions	267.2	61.2	165.7	3.6	1.6	2.3	4.9	27.9

[1] Federally Funded Research and Development Centers.

[2] Less than $50,000.

Source: National Science Foundation

Agency and subdivision	Total R&D obligations (millions of dollars)	Total research and development				Basic research		Applied research		Development
		Character of work (percent distribution)			Major performers[1] (percent of total)	Major fields of science[1] (percent of total)	Major performers[1] (percent of total)	Major fields of science[1] (percent of total)	Major performers[1] (percent of total)	Major performers[1] (percent of total)
		Basic research	Applied research	Development						
Department of Agriculture, total	$ 502.8	37	59	4	72 Intra. 26 Univ.	71 Life 13 Phy. Sci. 8 Soc.	69 Intra. 28 Univ.	58 Life 15 Soc. 12 Phy. Sci. 11 Eng.	72 Intra. 26 Univ.	95 Intra.
Agricultural Research Service	266.5	42	52	6	94 Intra.	74 Life 18 Phy. Sci.	94 Intra.	61 Life 21 Phy. Sci. 15 Eng.	95 Intra.	94 Intra.
Cooperative State Research Service	122.3	38	62	–	96 Univ.	69 Life 22 Soc.	96 Univ.	69 Life 22 Soc.	96 Univ.	–
Economic Research Service	25.0	15	85	–	98 Intra.	100 Soc.	98 Intra.	100 Soc.	98 Intra.	–
Farmer Cooperative Service	1.3	–	100	–	100 intra.	–	–	100 Soc.	100 Intra.	
Forest Service	85.7	27	66	7	92 Intra.	78 Life 9 Phy. Sci. 8 Environ.	76 Intra. 22 Univ.	60 Life 14 Eng. 13 Environ. 8 Soc.	97 Intra.	100 Intra.
Statistical Reporting Service	2.0	23	61	16	96 Intra.	100 Math.	96 Intra.	100 Math.	96 Intra.	96 Intra.
Department of Commerce, total	235.4	9	52	30	70 Intra. 13 Ind. 10 Univ.	57 Environ. 25 Phy. Sci. 13 Eng.	88 Intra.	35 Environ. 33 Life 13 Phy. Sci. 11 Eng.	78 Intra. 10 Univ.	48 Intra. 28 Ind. 12 Univ.
Bureau of the Census	1.3	16	49	35	87 Intra. 13 Univ.	57 Math 35 Psych.	82 Univ. 18 Intra.	71 Soc. 16 Psych. 13 Math.	100 Intra.	100 Intra.
Economic Development Administration	6.4	–	10	90	44 N.P. 40 S&L gov't 11 Univ.	–	–	100 Soc.	69 N.P. 23 Univ. 8 Intra.	44 S&L gov't 41 N.P. 10 Univ.
Maritime Administration	19.6	8	18	75	95 Ind.	100 Eng.	90 Ind.	89 Eng. 11 Soc.	85 Ind. 12 Intra.	97 Ind.
National Bureau of Standards	50.1	12	67	21	98 Intra.	82 Phy. Sci. 18 Eng.	92 Intra. 8 Univ.	58 Phy. Sci. 34 Eng. 8 Math.	99 Intra.	98 Intra.
National Fire Prevention and Control Administrarion	6.1	11	9	80	80 Intra. 20 Univ.	100 Other	69 Intra. 31 Univ.	100 Other	100 Intra.	80 Intra. 20 Univ.
National Oceanic and Atmospheric Administration	148.0	8	71	21	71 Intra. 14 Univ.	100 Environ.	98 Intra.	48 Environ. 46 Life	73 Intra. 13 Univ.	56 Intra. 21 Univ. 15 Ind.
Office of Minority Business Enterprise	1.9	–	19	81	83 N.P. 17 Intra.	–	–	100 Soc.	82 N.P. 18 Intra.	83 N.P. 17 Intra.
Office of Telecommunications	1.4	10	29	61	100 Intra.	100 Eng.	100 Intra.	100 Eng.	100 Intra.	100 Intra.
Patent and Trademark Office	.4	–	50	50	100 Intra.	–	–	100 Eng.	100 Intra.	100 Intra.
Department of Defense, total	11,225.2	3	15	82	67 Ind. 27 Intra.	30 Eng. 24 Environ. 22 Phy. Sci. 11 Life	39 Intra. 38 Univ. 20 Ind.	67 Eng. 9 Phy. Sci.	51 Ind. 37 Intra.	71 Ind. 25 Intra.
Department of the Army	2,425.4	2	14	84	60 Ind. 37 Intra.	37 Life 22 Eng. 15 Phy. Sci. 11 Environ. 8 Math	49 Univ. 39 Intra.	52 Eng. 18 Phy. Sci. 16 Life	64 Intra. 30 Ind.	66 Ind. 32 Intra.
Department of the Navy	3,974.5	3	6	91	69 Ind. 25 Intra.	34 Environ. 30 Phy. Sci. 15 Eng. 12 Life	47 Univ. 42 Intra. 8 Ind.	58 Eng. 21 Phy. Sci. 11 Math	64 Intra. 21 Ind.	74 Ind. 22 Intra.
Department of the Air Force	4,113.7	2	18	80	71 Ind. 22 Intra.	39 Eng. 29 Environ. 22 Phy. Sci.	47 Intra. 30 Ind. 23 Univ.	90 Eng.	70 Ind. 21 Intra.	73 Ind. 22 Intra.
Defense Agencies	680.7	6	56	39	53 Ind. 31 Intra.	65 Eng. 13 Math. 10 Phy. Sci. 8 Psych.	49 Ind. 33 Univ. 11 Intra.	43 Eng. 28 Other 10 Environ. 10 Phy. Sci.	63 Ind. 27 Intra.	52 Ind. 41 Intra.

Agency and subdivision	obligations (millions of dollars)	Character of work (percent distribution)			Major performers[1] (percent of total)	Major fields of science[1] (percent of total)	Major performers[1] (percent of total)	Major fields of science[1] (percent of total)	Major performers[1] (percent of total)	Major performers[1] (percent of total)
		Basic research	Applied research	Development						
Departmentwide Funds	1.0	–	100	–	35 Ind. 25 N.P. 15 Intra. 12 Univ. 9 N.P. FFRDC	–	–	31 Eng. 17 Phy. Sci. 17 Other 13 Life 9 Math 8 Soc.	35 Ind. 25 N.P. 15 Intra. 12 Univ. 9 N.P. FFRDC	–
Director of Test and Evaluation	29.9	–	–	100	87 Intra	–	–	–	–	87 Intra.
Department of Health, Education, and Welfare, total	2,537.9	26	55	19	52 Univ. 19 Intra. 15 N.P.	85 Life	66 Univ. 20 Intra. 11 N.P.	83 Life 8 Soc.	50 Univ. 22 Intra. 14 N.P.	40 Univ. 21 N.P. 16 S&L gov't 12 Ind. 8 Intra.
Alcohol, Drug Abuse and Mental Health Administration	127.8	51	49	–	54 Univ. 21 Intra. 12 N.P. 9 S&L gov't	58 Life 28 Psych. 10 Soc.	45 Univ. 36 Intra. 9 N.P.	50 Life 31 Psych. 13 Soc.	62 Univ. 15 N.P. 13 S&L gov't	–
Center for Disease Control . . .	52.9	–	100	–	50 Intra. 20 N.P. 14 Univ. 9 Ind.	–	–	100 Life	50 Intra. 20 N.P. 14 Univ. 9 Ind.	–
Food and Drug Administration	38.0	–	100	–	63 Intra. 21 Univ. 8 Ind.	–	–	100 Life	63 Intra. 21 Univ. 8 Ind.	–
Health Resources Administration	34.9	–	43	57	29 Univ. 25 Intra. 18 N.P. 13 Ind. 9 For.	–	–	66 Soc. 33 Life	50 Intra. 24 Univ. 11 S&L gov't 10 Ind.	33 Univ. 28 N.P. 16 Ind. 15 For.
Health Services Administration	13.2	17	63	20	39 Intra. 23 Univ. 13 For. 12 N.P. 10 Ind.	100 Life	75 For. 25 Intra.	100 Life	42 Intra. 35 Univ. 18 N.P.	49 Ind. 44 Intra.
National Institute of Education	90.0	10	14	75	38 N.P. 30 Univ. 14 S&L gov't 13 Intra.	100 Soc.	39 N.P. 29 Univ. 14 S&L gov't 13 Intra.	100 Soc.	39 N.P. 30 Univ. 14 S&L gov't 13 Intra.	38 N.P. 30 Univ. 14 S&L gov't 13 Intra.
National Institutes of Health	1,950.3	30	58	12	57 Univ. 18 Intra. 14 N.P.	90 Life	69 Univ. 18 Intra. 11 N.P.	90 Life	55 Univ. 20 Intra. 14 N.P.	41 Univ. 24 N.P. 19 Ind. 9 Intra.
Office of Education	88.8	–	6	94	65 S&L gov't 17 Univ. 14 N.P.	–	–	100 Soc.	63 Univ. 17 Ind. 14 N.P.	69 S&L gov't 14 Univ. 14 N.P.
Office of Human Development	62.0	–	11	89	80 Univ.	–	–	60 Soc. 22 Life 18 Psych.	50 Univ. 40 For.	84 Univ.
Office of the Assistant Secretary for Education	13.1	–	8	92	66 Univ. 25 N.P.	–	–	100 Soc.	93 N.P.	71 Univ. 19 N.P.
Office of the Secretary	30.6	23	77	–	49 S&L gov't 22 N.P. 15 Univ. 12 Intra.	100 Soc.	53 Univ. 33 Intra. 10 N.P.	100 Soc.	54 S&L gov't 25 N.P.	–
Social and Rehabilitation Service	9.2	–	100	–	29 Ind. 24 Univ. 21 S&L gov't 18 N.P. 8 Intra.	–	–	100 Soc.	29 Ind. 24 Univ. 21 S&L gov't 18 N.P. 8 Intra.	–

Agency and subdivision	tions (millions of dollars)	(percent distribution)			Major performers[1] (percent of total)	Major fields of science[1] (percent of total)	Major performers[1] (percent of total)	Major fields of science[1] (percent of total)	Major performers[1] (percent of total)	Major performers[1] (percent of total)
		Basic research	Applied research	Development						
Social Security Administration	27.0	9	91	–	69 Intra. 22 S&L gov't 8 Ind.	100 Soc.	100 Intra.	100 Soc.	66 Intra. 25 S&L gov't 9 Ind.	–
Department of Housing and Urban Development	77.7	–	53	47	40 Ind. 20 Intra. 16 S&L gov't 11 N.P. 9 N.P. FFRDC	–	–	86 Soc. 8 Eng.	34 Ind. 26 Intra. 17 N.P. FFRDC 11 S&L gov't	47 Ind. 21 S&L gov't 15 N.P. 14 Intra.
Department of the Interior, total . .	312.9	35	42	23	62 Intra. 26 Ind. 11 Univ.	80 Environ. 11 Life	94 Intra.	58 Eng. 21 Environ. 11 Life	45 Intra. 35 Ind. 17 Univ.	47 Intra. 45 Ind. 8 Univ.
Bonneville Power Administration	3.9	–	1	99	56 Ind. 41 Intra.	–	–	100 Eng.	83 Ind. 17 Intra.	56 Ind. 41 Intra.
Bureau of Land Management. . .	1.0	–	98	2	50 Intra. 50 Univ.	–	–	100 Life	51 Univ. 49 Intra.	100 Intra.
Bureau of Mines	129.2	1	55	44	50 Ind. 38 Intra. 12 Univ.	86 Phy. Sci. 14 Eng.	100 Intra.	93 Eng.	56 Ind. 31 Intra. 13 Univ.	47 Intra. 42 Ind. 10 Univ.
Bureau of Outdoor Recreation .	(2)	–	100	–	100 Intra.	–	–	100 Soc.	100 Intra.	–
Bureau of Reclamation	8.0	1	94	5	53 Intra. 20 Ind. 14 S&L gov't 13 Univ.	100 Eng.	100 Intra.	62 Environ. 31 Eng.	50 Intra. 21 Ind. 15 S&L gov't 14 Univ.	92 Intra. 8 Univ.
Geological Survey	114.8	80	20	–	97 Intra.	93 Environ.	98 Intra.	77 Environ. 11 Phy. Sci. 10 Eng.	93 Intra.	–
National Park Service	9.6	6	94	–	51 Univ. 43 Intra.	73 Life 19 Soc. 8 Environ.	64 Univ. 36 Intra.	46 Soc. 40 Life	50 Univ. 43 Intra.	–
Office of the Secretary	1.7	–	75	25	55 For. 23 Ind. 20 Intra.	–	–	51 Eng. 49 Environ.	57 For. 21 Ind. 20 Intra.	50 For. 29 Ind. 21 Intra.
Office of Water Research and Technology	22.3	18	53	29	45 Univ. 44 Ind. 10 Intra.	38 Environ. 24 Eng. 13 Life 11 Soc. 8 Phy. Sci.	74 Univ. 15 Ind. 11 Intra.	38 Eng. 20 Environ. 19 Life 12 Soc.	61 Univ. 27 Ind. 11 Intra.	94 Ind.
U. S. Fish and Wildlife Service	22.4	49	32	20	95 Intra.	100 Life	92 Intra.	100 Life	97 Intra.	100 Intra.
Department of Justice, total	42.5	20	36	44	32 N.P. 21 Univ. 16 Intra. 15 N.P. FFRDC 9 Ind.	82 Soc. 18 Other	51 Univ. 31 N.P. 14 Intra.	73 Soc. 14 Eng.	47 N.P. 20 Univ. 13 Intra. 10 N.P. FFRDC	24 N.P. FFRDC 19 Intra. 19 N.P. 16 Ind. 13 S&L gov't 8 Univ.
Bureau of Prisons	1.9	–	10	91	41 Intra. 33 Univ. 10 Ind. 9 N.P.	–	–	100 Soc.	57 Univ. 17 Intra. 17 S&L gov't 8 N.P.	44 Intra. 30 Univ. 11 Ind. 9 N.P.
Drug Enforcement Administration.	4.3	–	35	65	50 Ind. 28 Intra. 12 N.P. 11 Univ.	–	–	70 Eng. 30 Life	41 Ind. 30 Univ. 29 Intra.	54 Ind. 28 Intra. 18 N.P.
Federal Bureau of Investigation	1.4	–	–	100	86 Ind. 14 Intra.	–	–	–	–	86 Ind. 14 Intra.
Immigration and Naturalization Service	.4	–	50	50	95 Ind.	–	–	50 Eng. 50 Other	95 Ind.	95 Ind.

Agency and subdivision	R&D obligations (millions of dollars)	Character of work (percent distribution): Basic research	Applied research	Development	Major performers[1] (percent of total)	Major fields of science[1] (percent of total)	Major performers[1] (percent of total)	Major fields of science[1] (percent of total)	Major performers[1] (percent of total)	Major performers[1] (percent of total)
Law Enforcement Assistance Administration.	34.5	26	38	37	37 N.P. 23 Univ. 19 N.P. FFRDC 13 Intra. 8 S&L gov't	82 Soc. 18 Other	51 Univ. 31 N.P. 14 Intra.	82 Soc. 8 Eng. 8 Other	54 N.P. 19 Univ. 12 N.P. FFRDC 11 Intra.	36 N.P. FFRDC 23 N.P. 18 S&L gov't 15 Intra. 8 Univ.
Department of Labor, total	34.2	5	62	33	37 Intra. 27 Ind. 16 Univ. 15 N.P.	97 Soc.	54 Univ. 22 Intra. 12 Ind. 12 N.P.	99 Soc.	47 Intra. 33 Ind. 10 Univ.	32 N.P. 23 Univ. 20 Intra. 16 Ind. 8 S&L gov't
Bureau of Labor Statistics . . .	1.7	–	44	56	100 Intra.	–	–	100 Soc.	100 Intra.	100 Intra.
Employment and Training Administration.	15.8	4	32	65	27 N.P. 26 Univ. 21 Intra. 17 Ind. 8 S&L gov't	92 Soc. 8 Phy. Sci.	88 Univ. 12 Intra.	95 Soc.	40 Intra. 20 Univ. 17 Ind. 13 N.P. 9 S&L gov't	35 N.P. 25 Univ. 18 Ind. 12 Intra. 9 S&L gov't
Employment Standards Administration	5.5	–	100	–	100 Intra.	–	–	100 Soc.	100 Intra.	–
Labor-Management Services Administration	2.8	41	59	–	37 Univ. 26 Intra. 19 Ind. 19 N.P.	100 Soc.	37 Univ. 26 Intra. 18 Ind. 18 N.P.	100 Soc.	38 Univ. 24 Intra. 19 Ind. 19 N.P.	–
Occupational Safety and Health Administration.	6.3	–	100	–	87 Ind. 13 Intra.	–	–	100 Soc.	87 Ind. 13 Intra.	–
Office of the Secretary	2.2	–	100	–	31 Intra. 24 N.P. 19 Ind. 19 Univ.	–	–	100 Soc.	31 Intra. 24 N.P. 19 Ind. 19 Univ.	–
Department of State, total	33.4	5	67	28	47 Univ. 21 N.P. 15 Intra. 9 For.	100 Life	100 Intra.	69 Life 24 Soc.	55 Univ. 24 N.P. 10 Ind.	35 Univ. 24 For. 17 N.P. 13 Ind. 11 Intra.
Departmental Funds	1.5	–	67	33	46 S&L gov't 28 Ind. 18 Intra.	–	–	100 Soc.	68 S&L gov't 22 Intra.	85 Ind. 10 Intra.
Agency for International Development	31.9	5	67	28	49 Univ. 22 N.P. 15 Intra. 9 For.	100 Soc.	100 Intra.	72 Life 20 Soc.	58 Univ. 25 N.P. 10 Intra.	37 Univ. 25 For. 18 N.P. 11 Intra. 9 Ind.
Department of Transportation, total	351.8	(3)	16	84	54 Ind. 20 Intra. 14 S&L gov't	100 Environ.	100 Intra.	90 Eng.	48 Ind. 31 Intra. 13 S&L gov't	55 Ind. 18 Intra. 14 S&L gov't
Federal Aviation Administration	109.2	–	14	86	64 Ind. 24 Intra. 10 N.P. FFRDC	–	–	98 Eng.	77 Ind. 21 Intra.	62 Ind. 25 Intra. 12 N.P. FFRDC
Federal Highway Administration	40.8	–	4	96	55 S&L gov't 23 Univ. 20 Ind.	–	–	100 Eng.	54 Ind. 13 Univ. 13 S&L gov't 10 Intra. 10 N.P.	57 S&L gov't 23 Univ. 19 Ind.
Federal Railroad Administration	42.8	–	15	85	61 Ind. 31 Intra.	–	–	100 Eng.	75 Intra. 24 Ind.	68 Ind. 23 Intra.
National Highway Traffic Safety Administration	42.5	–	34	66	52 Ind. 26 S&L gov't 10 N.P.	–	–	78 Eng. 15 Life	64 Ind. 12 N.P. 11 S&L gov't	45 Ind. 34 S&L gov't 9 N.P.

Agency and subdivision	obligations (millions of dollars)	Character of work (percent distribution)			Major performers[1] (percent of total)	Major fields performers[1] (percent of total)	Major performers[1] (percent of total)	Major fields of science[1] (percent of total)	Major performers[1] (percent of total)	Major performers[1] (percent of total)
		Basic research	Applied research	Development						
Office of the Secretary	29.9	–	14	86	39 Ind. 38 Intra. 13 Univ.	–	–	56 Eng. 37 Environ.	41 Intra. 26 S&L gov't 25 Ind.	42 Ind. 38 Intra. 14 Univ.
U.S. Coast Guard	18.3	(3)	20	80	66 Ind. 26 Intra.	100 Environ.	100 Intra.	92 Eng. 8 Environ.	62 Ind. 29 Intra.	68 Ind. 24 Intra.
Urban Mass Transportation Administration	68.3	–	16	84	57 Ind. 20 S&L gov't 19 Intra.	–	–	100 Eng.	54 Intra. 40 S&L gov't	67 Ind. 17 S&L gov't 12 Intra.
Department of the Treasury, total	1.6	–	28	72	100 Intra.	–	–	97 Phy. Sci.	100 Intra.	100 Intra.
Bureau of Engraving and Printing	1.6	–	28	72	100 Intra.	–	–	97 Phy. Sci.	100 Intra.	100 Intra
OTHER AGENCIES										
Action	.1	100	–	–	60 Ind. 40 Intra.	100 Soc.	60 Ind. 40 Intra.	–	–	–
Advisory Commission on Intergovernmental Relations	1.4	–	100	–	100 Intra.	–	–	100 Soc.	100 Intra.	–
Civil Aeronautics Board	.5	–	100	–	100 Intra.	–	–	100 Soc.	100 Intra.	–
Civil Service Commission	3.9	14	24	62	69 Intra. 31 S&L gov't	100 Psych.	100 Intra.	100 Psych.	100 Intra.	50 Intra. 50 S&L gov't
Community Services Administration	39.0	–	–	100	97 N.P.	–	–	–	–	97 N.P.
Consumer Product Safety Commission	5.6	–	34	66	68 Intra. 20 N.P.	–	–	89 Eng. 11 Soc.	37 Intra. 26 N.P. 21 S&L gov't 11 Univ.	84 Intra. 16 N.P.
Energy Research and Development Administration	3,279.8	9	14	77	36 Ind. 26 Univ. FFRDC 26 Ind. FFRDC	82 Phy. Sci. 15 Eng.	63 Univ. FFRDC 23 Univ. 13 Ind. FFRDC	42 Phy. Sci. 36 Life 17 Eng.	42 Univ. FFRDC 21 Ind. 13 Univ. 11 Ind. FFRDC	43 Ind. 30 Ind. FFRDC 19 Univ. FFRDC
Environmental Protection Agency	246.5	7	50	43	47 Intra. 24 Ind. 15 Univ.	61 Life 29 Phy. Sci. 8 Environ.	92 Univ.	43 Eng. 23 Life 23 Phy. Sci.	46 Intra. 27 Ind. 16 Univ.	55 Intra. 24 Ind. 11 N.P.
Federal Communications Commission	1.6	–	100	–	78 Intra. 22 Ind.	–	–	56 Eng. 44 Soc.	78 Intra. 22 Ind.	–
Federal Energy Administration	6.1	–	–	100	79 Ind. 13 Intra.	–	–	–	–	79 Ind. 13 Intra.
Federal Home Loan Bank Board	.8	–	100	–	98 Intra.	–	–	100 Soc.	98 Intra.	–
Federal Trade Commission	1.3	–	100	–	100 Intra.	–	–	100 Soc.	100 Intra.	–
General Services Administration	2.8	3	3	94	73 Ind. 25 Intra.	71 Other 29 Eng.	71 Intra. 29 N.P.	100 Eng.	64 Ind. 33 N.P.	76 Ind. 24 Intra.
Library of Congress	3.6	–	13	87	92 Intra. 8 Ind.	–	–	100 Other	100 Intra.	91 Intra. 9 Ind.
National Aeronautics and Space Administration	3,546.6	7	17	76	60 Ind. 34 Intra.	63 Phy. Sci. 16 Eng. 15 Environ.	54 Intra. 21 Univ. 20 Ind.	68 Eng. 24 Environ.	62 Intra. 28 Ind.	71 Ind. 26 Intra.
National Science Foundation	717.5	88	10	2	74 Univ. 9 Intra.	28 Phy. Sci. 27 Environ. 19 Life 12 Eng.	78 Univ. 8 Intra.	26 Soc. 20 Eng. 18 Environ. 14 Other 9 Life 8 Phy. Sci.	48 Univ. 15 N.P. 14 Intra. 13 Ind.	54 Univ. 33 N.P. 13 Ind.
Nuclear Regulatory Commission	114.4	–	100	–	69 Ind. FFRDC 13 Univ. FFRDC	–	–	100 Eng.	69 Ind. FFRDC 13 Univ. FFRDC	–

Agency and subdivision	Total R&D obligations (millions of dollars)	Total research and development				Basic research		Applied research		Development
		Character of work (percent distribution)			Major performers[1] (percent of total)	Major fields of science[1] (percent of total)	Major performers[1] (percent of total)	Major fields of science[1] (percent of total)	Major performers[1] (percent of total)	Major performers[1] (percent of total)
		Basic research	Applied research	Devel-opment						
Office of Telecommunications Policy	2.7	7	53	40	80 Intra. 13 Ind.	69 Life 17 Soc. 15 Phy. Sci.	50 Ind. FFRDC 25 Univ. 24 Ind.	75 Eng. 25 Soc.	76 Intra. 21 Ind.	100 Intra.
Small Business Administration . .	.6	–	100	–	73 Ind. 18 Intra. 9 Univ.	–	–	100 Soc.	73 Ind. 18 Intra. 9 Univ.	–
Smithsonian Institution	33.4	100	–	–	92 Intra.	44 Life 33 Soc. 17 Phy. Sci.	92 Intra.	–	–	–
Tennessee Valley Authority	22.0	–	89	11	54 N.P. 45 Intra.	–	–	75 Eng. 12 Life 12 Phy. Sci.	60 N.P. 39 Intra.	100 Intra.
U.S. Arms Control and Disarmament Agency	2.3	–	73	27	42 Ind. 31 N.P. 19 Ind. FFRDC 8 Intra.	–	–	54 Eng. 25 Soc. 16 Math	41 Ind. 26 Ind. FFRDC 23 N.P. 10 Intra.	53 N.P. 45 Ind.
U.S. Information Agency	.1	–	85	15	100 Intra.	–	–	100 Eng.	100 Intra.	100 Intra.
Veterans Administration	99.6	4	85	11	98 Intra.	91 Life	99 Intra.	91 Life	100 Intra.	81 Intra. 13 Univ.

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[1] "Major" is here defined as any performer or field of science that singly accounts for at least 8 percent of total funds.

[2] Less than $500,000.

[3] Less than 0.5 percent.

NOTE: Intramural activities cover costs associated with the administration of intramural and extramural programs by Federal personnel as well as actual intramural performance.

Source: National Science Foundation

ABBREVIATIONS

Performers

Intra. – Intramural.
Ind. – Industrial firms excluding Federally Funded Research and Development Centers (FFRDC's).
Ind. FFRDC – FFRDC's administered by industrial firms.
Univ. FFRDC – FFRDC's administered by universities.
N.P. – Other nonprofit institutions excluding FFRDC's.
NPFFRDC – FFRDC's administered by other nonprofit institutions.
For. – Foreign.

Fields of Science

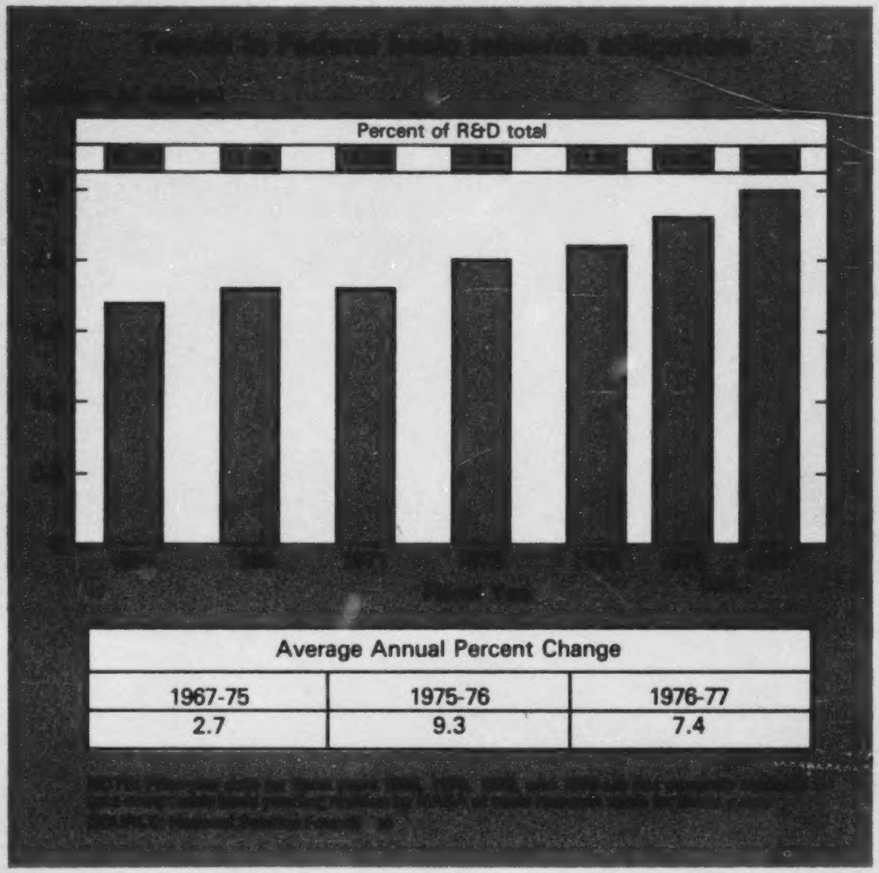
Life – Life sciences
Psych. – Psychology
Phy. Sci. – Physical sciences
Math. – Mathematics
Eng. – Engineering
Soc. – Social sciences
Environ. – Environmental sciences

Section 3: BASIC RESEARCH

- In 1977 Federal obligations for basic research amount to an estimated $2,519 million, compared with a 1976 total of $2,347 million. The 1976-77 increase of 7 percent shows little real growth.

- In constant dollars the 1977 total is an estimated 18 percent less than in 1967.

- Throughout the 1967-77 decade the share of basic research within the Federal R&D total has fluctuated between 10 percent and nearly 12 percent. The 1977 share is an estimated 11 percent.



Average Annual Percent Change		
1967-75	1975-76	1976-77
2.7	9.3	7.4

Agencies

- Five agencies—HEW, NSF, DOD,
sponsor approximately 85 percen
rent (1975-77) period, compared w
larger share for the remaining age
ing basic research efforts on the p

- Throughout the 1967-77 decade
agency for basic research, account
research total in 1967 and an esti
HEW shows a nominal dollar inc
1977, NIH, the chief subdivision, i
resulting from the fact that final c
priation took place after the budg
1976 NIH total higher than the 19

- NSF funding for basic research h
1977 NSF will be the second larg
cent of the basic research total, u
cantly higher than the 14-percent
scheduled NSF increase of more
almost three-fifths of the 1977 tot
Support is spread over all scien
emphasis on physics, physiology,
istry, atmospheric sciences, and g

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[8] In previous reports NASA was shown as th
present report, however, reflects a reclassificatio
most major NASA projects now classified as deve
transport technology. In former years substantia
basic research or applied research.

earch amount to an estimated
l of $2,347 million. The 1976-77
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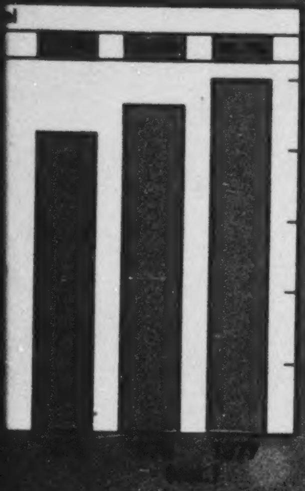
timated 18 percent less than in

e of basic research within the
a 10 percent and nearly 12 per-
ercent.



Change	
	1976-77
	7.4

Agencies

- Five agencies—HEW, NSF, DOD, ERDA, and NASA—are expected to sponsor approximately 85 percent of the Federal basic total in the current (1975-77) period, compared with 88 percent in 1967. The somewhat larger share for the remaining agencies is largely a reflection of expanding basic research efforts on the part of USDA and Interior.

- Throughout the 1967-77 decade HEW has been the leading support agency for basic research, accounting for 22 percent of the Federal basic research total in 1967 and an estimated 27 percent in 1977.[8] Although HEW shows a nominal dollar increase for its basic research effort in 1977, NIH, the chief subdivision, is scheduled for a slight overall decline, resulting from the fact that final congressional action on the 1976 appropriation took place after the budget submission in January, making the 1976 NIH total higher than the 1977 request.

- NSF funding for basic research has more than doubled since 1967. In 1977 NSF will be the second largest support agency, providing 25 percent of the basic research total, up from 23 percent in 1976 and significantly higher than the 14-percent share of the total shown in 1967. The scheduled NSF increase of more than $100 million will account for almost three-fifths of the 1977 total Federal increase for basic research. Support is spread over all science disciplines and engineering, with emphasis on physics, physiology, cellular and molecular biology, chemistry, atmospheric sciences, and geological sciences.

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[8] In previous reports NASA was shown as the leading agency in basic research support. The present report, however, reflects a reclassification of NASA programs by character of work with most major NASA projects now classified as development since they largely generate outer space transport technology. In former years substantial portions of these programs were classified as basic research or applied research.

[Dollars in millions]

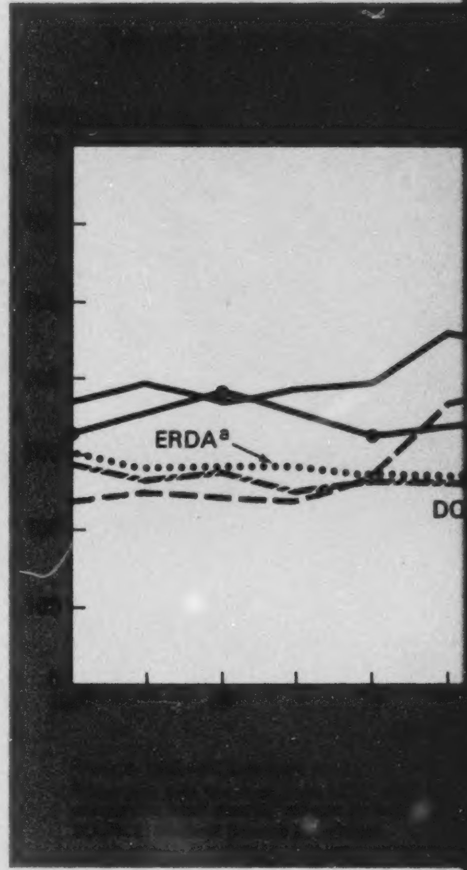
Agency	Actual	Estimates			
	1975	1976	Percent change 1975-76	1977	Percent change 1976-77
Total	$2,146	$2,345	+ 9.3	$2,519	+ 7.4
Department of Health, Education and Welfare	592	670	+13.2	671	+ .1
National Science Foundation . .	486	530	+ 9.0	631	+19.0
Department of Defense	236	255	+ 8.2	292	+14.4
Energy Research and Development Administration	247	274	+11.1	289	+ 5.4
National Aeronautics and Space Administration	242	244	+ .7	256	+ 5.0
Other agencies	343	372	+ 8.4	380	+ 2.5

Source: National Science Foundation

- DOD is planning to increase its basic research support in each year of the current (1975-77) period and will account for more than one-fifth of the total Federal increase in 1977. The DOD share of the 1977 Federal basic research total is an estimated 12 percent, compared with 16 percent in 1967. Most of the DOD basic research effort can be found in the military sciences and covers such areas as oceanography, physics, atmospheric sciences, clinical medical sciences, and electrical engineering.

- In the current (1975-77) period ERDA shows increased support for basic research each year. The ERDA share of the Federal total for basic research is an estimated 11 percent in 1977. Basic research support by ERDA is directed towards work in the basic energy sciences, to improve energy technologies, and in high-energy physics to increase knowledge of the fundamental behavior of atomic particles, matter, and energy.

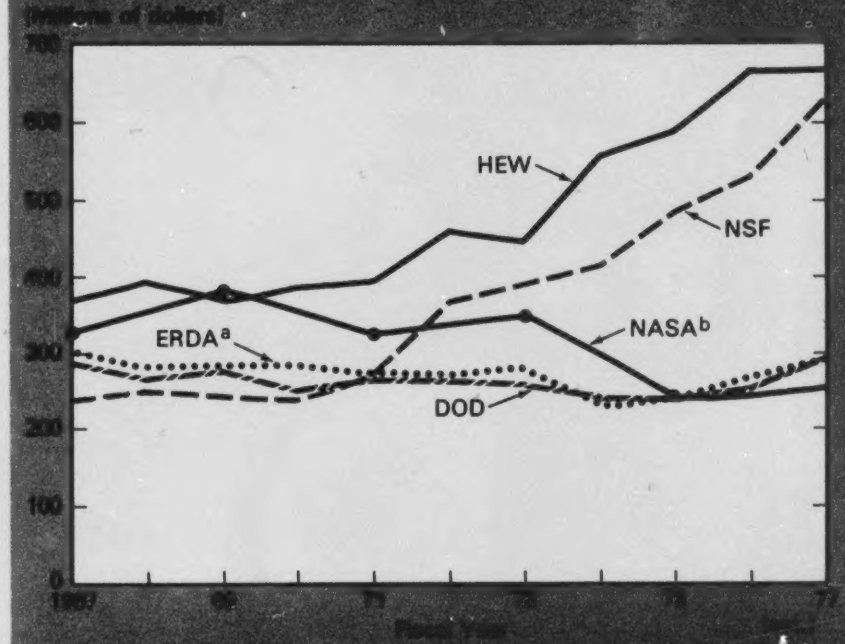
- NASA reflects increased support in the current (1975-77) period, but basic research totals remain significantly lower than the 1967 funding level. As a share of overall Federal basic research, NASA programs are 10 percent in both 1976 and 1977, substantially lower than the 19-percent share in 1967.



by agency

Estimates		
Percent change 1975-76	1977	Percent change 1976-77
+ 9.3	$2,519	+ 7.4
+13.2	671	+ .1
+ 9.0	631	+19.0
+ 8.2	292	+14.4
+11.1	289	+ 5.4
+ .7	256	+ 5.0
+ 8.4	380	+ 2.5

Trends in Federal obligations for basic research, by agency



[a] Prior to 1974 AEC data were used.

[b] [illegible]

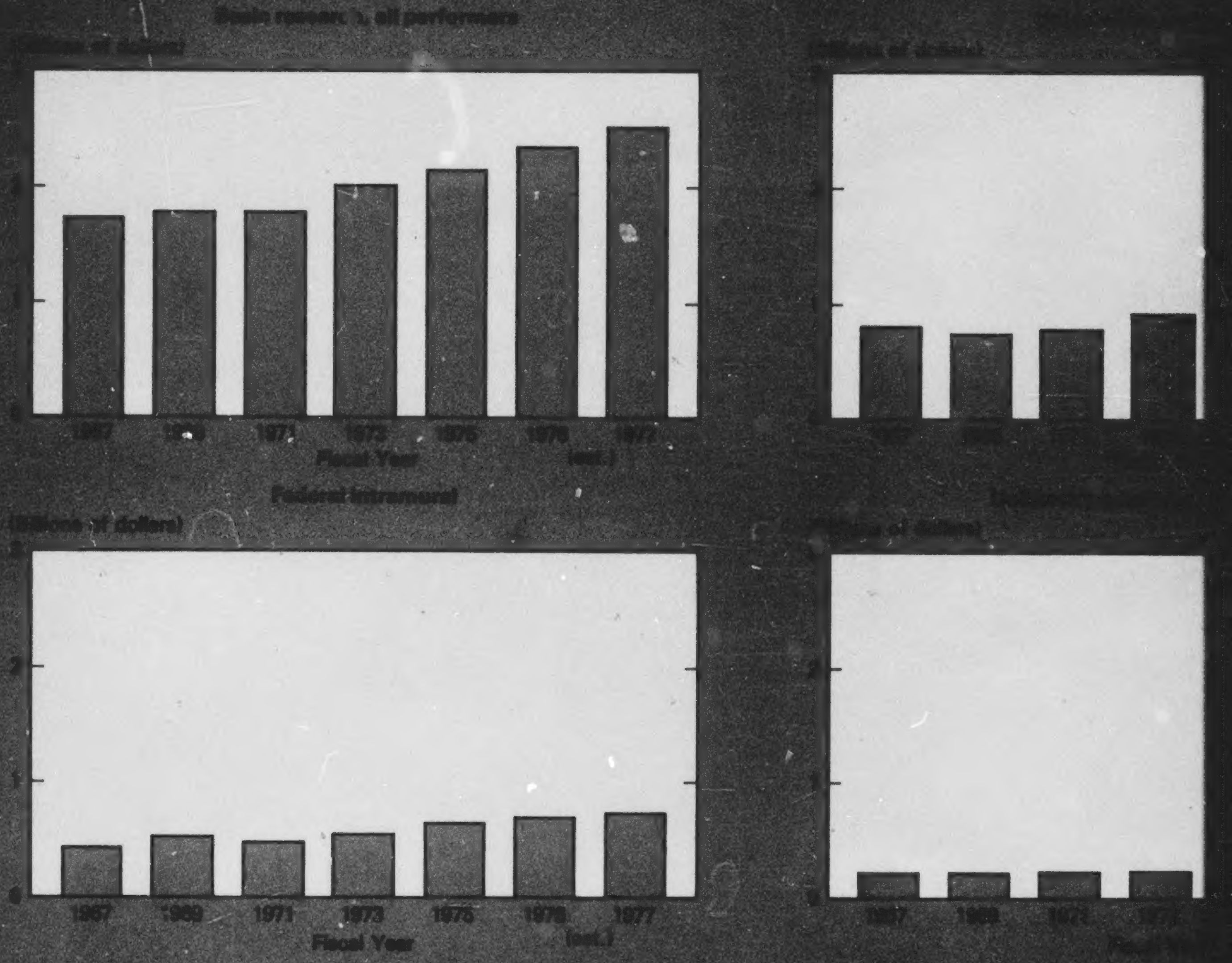
SOURCE: National Science Foundation

ch support in each year of the
or more than one-fifth of the
are of the 1977 Federal basic
compared with 16 percent in
can be found in the military
raphy, physics, atmospheric
trical engineering.

s increased support for basic
the Federal total for basic
7. Basic research support by
energy sciences, to improve
ysics to increase knowledge
icles, matter, and energy.

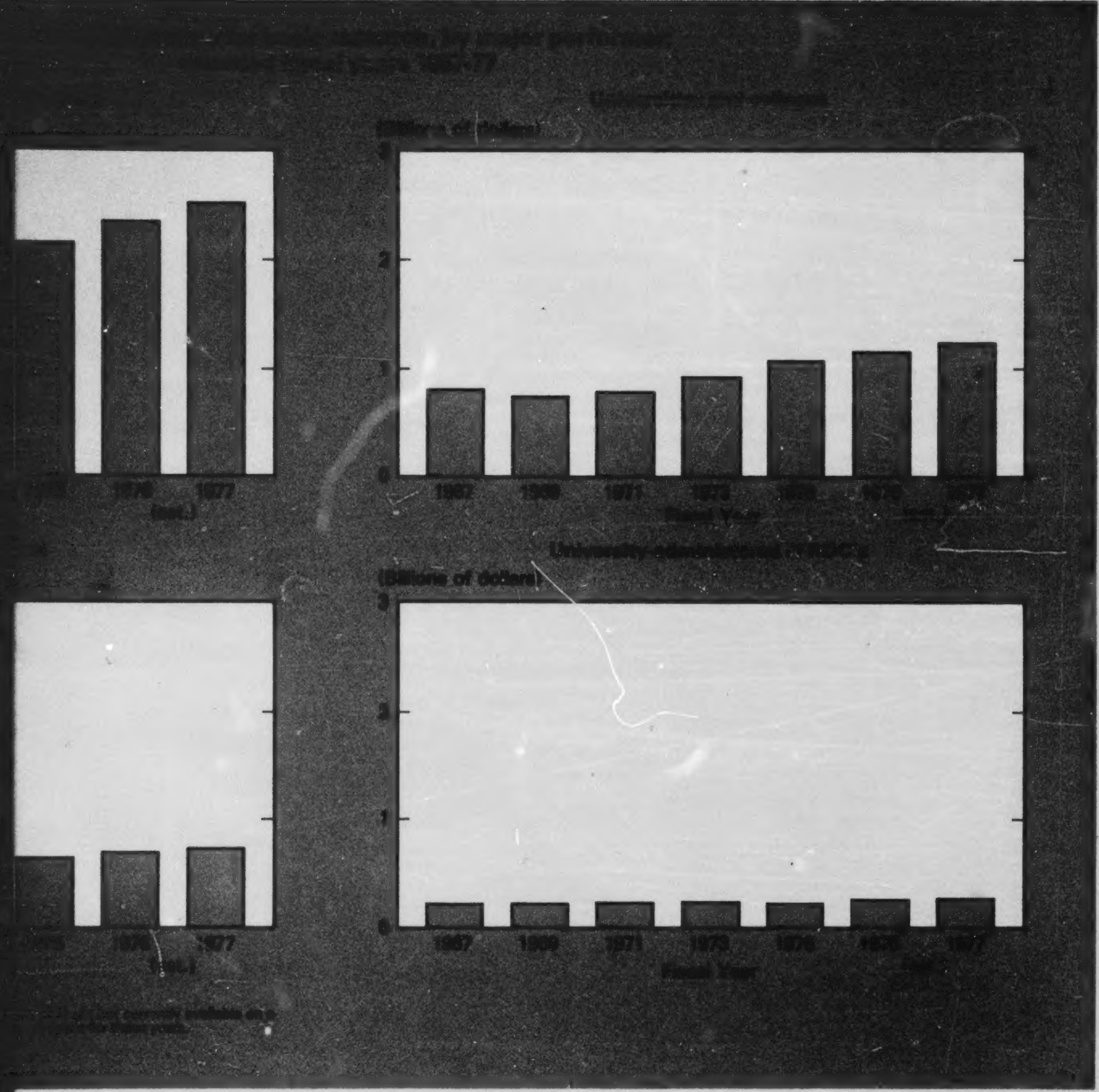
urrent (1975-77) period, but
lower than the 1967 funding
search, NASA programs are
tially lower than the 19-per-

Federal obligations for basic research, by [illegible]
selected fiscal years 1967-77



NOTE: Prior-year data for fiscal years 1968, 1970, 1972, and 1974 are not currently available on a comparable basis pending revision by NASA of basic research totals for those years.

SOURCE: National Science Foundation


University-administered FFRDC's
(Billions of dollars)
3
2
1
0
1967
1969
1971
1973
1975
1976
1977
Fiscal Year
(est.)

Performers

- Throughout the 1967-77 decade universities and colleges have continually made up the leading basic research performing sector. They are scheduled to account for nearly one-half of the Federal basic research total in each year of the current (1975-77) period, somewhat more than the 45-percent share in 1967 and most interim years. NSF is expected to increase support to this sector by $86 million in 1977, representing almost all of the total Federal increase for academically performed basic research. The NSF share of the academic basic research total is estimated at 39 percent in 1977, up from 26 percent in 1967. HEW follows with a 35-percent share, up from 31 percent in 1967. By contrast, the combined share of DOD, ERDA, and NASA, which represented nearly two-thirds of the basic research performed by universities and colleges in 1967, is expected to be 18 percent in 1977.

- The share of the Federal basic research effort performed intramurally is expected to be 29 percent in 1977, up from 24 percent in 1967. Within this 10-year span support by agencies has varied considerably. NASA continues to be the leading "intramural" agency, providing an estimated one-fifth of all Federal intramural support in 1977 but less than one-fourth share in 1967.

Federal obligations for basic research, by performer

[Dollars in millions]

Performer	Actual	Estimates			
	1975	1976	Percent change 1975-76	1977	Percent change 1976-77
Total	$2,146	$2,345	+ 9.3	$2,519	+ 7.4
Federal intramural	645	692	+ 7.4	727	+ 5.0
Industrial firms[1]	105	125	+19.2	162	+29.0
Universities and colleges	1,065	1,156	+ 8.5	1,243	+ 7.5
FFRDC's administered by universities	205	231	+12.5	240	+ 3.9
Other nonprofit institutions[1] . .	102	113	+10.8	117	+ 4.3
Other performers	24	28	+16.7	30	+10.5

[1] Includes Federally Funded Research and Development Centers (FFRDC's) administered by this sector.

Source: National Science Foundation

- HEW will account for almost one-fi
USDA also for almost one-fifth. In 1
lower while the DOD share was hi

- In the current (1975-77) period, FF
are the third largest basic research
uled to accomplish 10 percent of the
and ERDA is expected to provide t

- Although industrial performance i
dollar increase among all sectors i
well below the 1967 total. The sha
performed by industrial firms (incl
6 percent, substantially less than
decrease is attributable to reduced
have increased support between 19
the NASA decrease.

s and colleges have continu- performing sector. They are of the Federal basic research period, somewhat more than rim years. NSF is expected to nillion in 1977, representing academically performed basic sic research total is estimated 1967. HEW follows with a 35- 7. By contrast, the combined epresented nearly two-thirds rsities and colleges in 1967, is

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n, by performer

Estimates		
Percent change 1975-76	1977	Percent change 1976-77
+ 9.3	$2,519	+ 7.4
+ 7.4	727	+ 5.0
+19.2	162	+29.0
+ 8.5	1,243	+ 7.5
+12.5	240	+ 3.9
+10.8	117	+ 4.3
+16.7	30	+10.5

s (FFRDC's) administered by this sector.

- HEW will account for almost one-fifth of the intramural total in 1977 and USDA also for almost one-fifth. In 1967 the shares of these agencies were lower while the DOD share was higher.

- In the current (1975-77) period, FFRDC's administered by universities are the third largest basic research performing sector. They are scheduled to accomplish 10 percent of the Federal basic research total in 1977, and ERDA is expected to provide three-fourths of the support.

- Although industrial performance is scheduled for the highest relative dollar increase among all sectors in 1977, the level of support remains well below the 1967 total. The share of the Federal basic research total performed by industrial firms (including FFRDC's) will be an estimated 6 percent, substantially less than the 12-percent share in 1967. The decrease is attributable to reduced support by NASA. DOD and ERDA have increased support between 1967 and 1977, but not enough to offset the NASA decrease.

Fields of Science

- In the 1975-77 period variation in the shares of the basic research total represented by major fields was slight, but over a longer period most fields show some change.

- The life sciences will represent a 36-percent share of the Federal basic research effort in 1977, up from 33 percent in 1967. HEW will provide almost two-thirds of the total, almost the same as in 1967. Other important sources of support for the life sciences are USDA and NSF.

- The physical sciences are scheduled to account for 29 percent of the basic research total in 1977, compared with 35 percent 10 years previously. ERDA continues to be the leading support agency, providing one-third of the overall amount. NSF is expected to account for one-fourth and NASA for somewhat more than one-fifth.

- The environmental sciences will represent 15 percent of the basic research total in each year of the current period, up from a 12-percent share in 1967. The leading support agencies in 1967 were NASA and DOD, which together provided three-fifths of the total. In 1977 NSF is the major source of support, providing more than two-fifths, followed by Interior with more than one-fifth.

- Engineering has fluctuated between 10 percent and 11 percent of the basic research total since 1975, compared with 9 percent in 1967. DOD, NSF, ERDA, and NASA are the major contributing agencies; DOD is the largest, accounting for an estimated one-third of the effort in 1977.

- Social sciences represent 4 percent of the basic research total in 1977, compared with 3 percent in 1975 and in 1967. Mathematics will remain at 3 percent and psychology at 2 percent throughout the 1975-77 period.

Federal obligations for basic

[Dollars in

Field of science	1967
Total	$1,728
Life sciences	573
Psychology	60
Physical sciences	605
Astronomy	107
Chemistry	123
Physics	348
Other	27
Environmental sciences	209
Atmospheric	121
Geological	54
Oceanography	33
Other	–
Mathematics	65
Engineering	156
Social sciences	57
Other sciences	4

Source: National Science Foundation

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Mathematics will remain at
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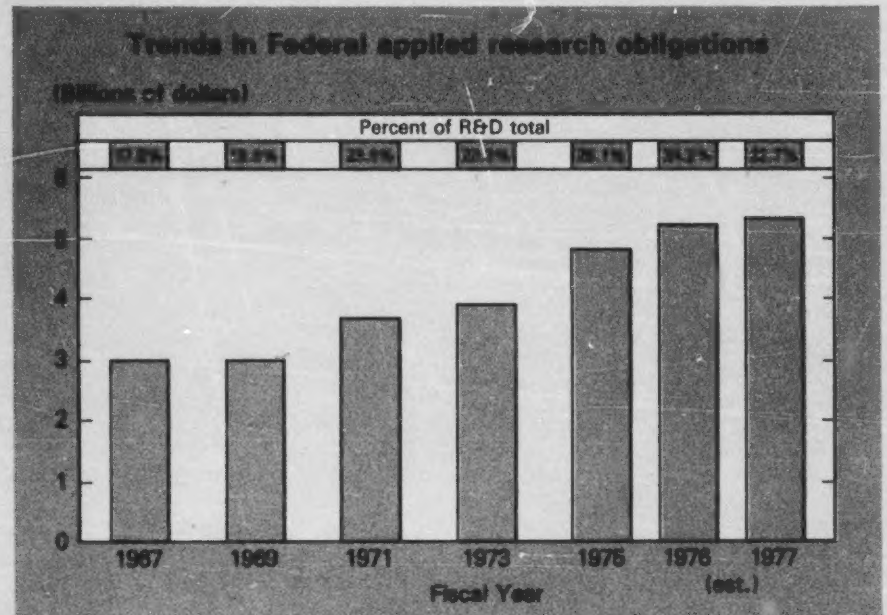
Federal obligations for basic research, by field of science

[Dollars in millions]

Field of science	Actual		Estimates	
	1967	1975	1976	1977
Total	$1,728	$2,146	$2,345	$2,519
Life sciences	573	776	877	909
Psychology	60	48	51	53
Physical sciences	605	616	660	718
Astronomy	107	131	124	143
Chemistry	123	158	177	188
Physics	348	319	348	376
Other	27	8	11	12
Environmental sciences	209	331	357	390
Atmospheric	121	116	127	139
Geological	54	128	139	148
Oceanography	33	82	86	98
Other	–	5	5	4
Mathematics	65	59	62	71
Engineering	156	228	238	266
Social sciences	57	73	87	99
Other sciences	4	15	13	14

Source: National Science Foundation

- Federal applied research activities are expected to grow from $4,783 million in 1975 to $5,223 million in 1976 and $5,331 million in 1977. The 1977 increase of 2 percent represents a moderate decline when the effects of inflation are considered.



Average Annual Percent Change		
1967-75	1975-76	1976-77
6.2	9.2	2.1

NOTE: Prior-year data for fiscal years 1968, 1970, 1972, and 1974 are not currently available on a comparable basis pending revision by NASA of applied research totals for those years.

SOURCE: National Science Foundation

- In real terms the 1977 applied re than the 1967 total, but applied r nent which has not decreased i period.

- The applied research share of the F when it represented 18 percent of of 23 percent, however, is less tha 1976 share of 24 percent.

Agencies

- DOD, HEW, and NASA have bee research in the 1967-77 decade. T applied research total in 1967, ha 70 percent in 1976 and in 1977 as plied research efforts.

- DOD has been the leading suppor out the 1967-77 decade. The DOD among all the agencies. Most of th and the Navy for work in engine cially physics. However, the DOD total is only 32 percent in 1977, c 1967 when other agencies had sm

- The HEW overall level of supp doubled between 1967 and 197 Reductions are primarily found (NIH), which jointly account for research effort of HEW, and in t Health Administration, which sup effort. The HEW share of the Fede percent in 1967 to 28 percent in 197 cent in 1977.

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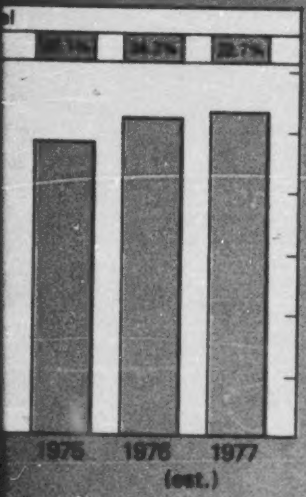

Change
1976-77
2.1

1974 are not currently available
research totals for those years.

- In real terms the 1977 applied research total is barely 1 percent higher than the 1967 total, but applied research is the only R&D work component which has not decreased in actual level of effort in the 10-year period.

- The applied research share of the Federal R&D total has grown since 1967 when it represented 18 percent of the Federal R&D total. The 1977 share of 23 percent, however, is less than the 1975 share of 25 percent and the 1976 share of 24 percent.

Agencies

- DOD, HEW, and NASA have been the three largest sponsors of applied research in the 1967-77 decade. Their combined share, 84 percent of the applied research total in 1967, has gradually decreased to an estimated 70 percent in 1976 and in 1977 as other agencies have increased their applied research efforts.

- DOD has been the leading support agency for applied research throughout the 1967-77 decade. The DOD dollar increase in 1977 is the largest among all the agencies. Most of the increase is attributable to the Army and the Navy for work in engineering and the physical sciences, especially physics. However, the DOD share of the Federal applied research total is only 32 percent in 1977, compared with a share of 44 percent in 1967 when other agencies had smaller research programs.

- The HEW overall level of support for applied research has nearly doubled between 1967 and 1977, despite an anticipated 1977 drop. Reductions are primarily found in the National Institutes of Health (NIH), which jointly account for more than four-fifths of the applied research effort of HEW, and in the Alcohol, Drug Abuse, and Mental Health Administration, which supports the next largest applied research effort. The HEW share of the Federal applied research total grew from 24 percent in 1967 to 28 percent in 1976, but is scheduled to decline to 26 percent in 1977.

[Dollars in millions]

Agency	Actual	Estimates			
	1975	1976	Percent change 1975-76	1977	Percent change 1976-77
Total	$4,783	$5,223	+ 9.2	$5,331	+ 2.1
Department of Defense	1,558	1,595	+ 2.4	1,720	+ 7.8
Department of Health, Education and Welfare	1,334	1,458	+ 9.3	1,392	- 4.5
National Aeronautics and Space Administration	545	577	+ 5.8	603	+ 4.5
Energy Research and Development Administration	346	422	+21.8	460	+ 9.0
Department of Agriculture	248	281	+13.4	295	+ 5.0
Department of Commerce.	124	140	+12.8	145	+ 3.5
Department of the Interior	108	139	+28.9	132	- 4.7
Environmental Protection Agency .	124	158	+27.4	123	-22.0
Nuclear Regulatory Commission . .	64	101	+57.5	114	+13.2
Veterans Administration	83	87	+ 4.8	85	- 2.8
National Science Foundation	84	77	- 8.9	72	- 5.8
Department of Transportation . . .	54	55	+ 1.9	56	+ 2.6
Other agencies	111	133	+20.0	134	+ .1

Source: National Science Foundation

- NASA has increased dollar support for applied research by approximately 5 percent in each year of the current period, raising the NASA applied research total to one of the highest levels in the past decade. This contrasts with the fluctuating levels of funding shown for the NASA programs in earlier years. NASA is the third largest support agency for applied research, but its share of the applied research total has dropped from 16 percent in 1967 to 11 percent in the current (1975-77) period. Much of the NASA effort is related to determining the makeup of the upper atmosphere and the effects on the atmosphere from natural and man-caused events—such as X-rays, gamma rays, and infrared, ultraviolet, and radio emissions that cannot be studied from ground-based observatories. Applied research activities are also concerned with earth resources detection, environmental, ocean, and weather monitoring, and communications.

- The applied research increase plan
est of all agencies, and the 1977 fun
of 1967. In 1977 ERDA accounts
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- USDA sponsorship of applied res
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Trends in Federal ob
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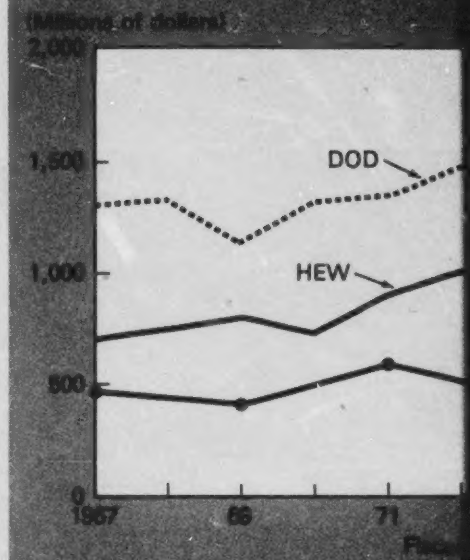

*Prior-year data for fiscal years 1969, 1970,
a comparable basis pending revision by NAS
SOURCE: National Science Foundation

Estimates		
Percent change 1975-76	1977	Percent change 1976-77
+ 9.2	$5,331	+ 2.1
+ 2.4	1,720	+ 7.8
+ 9.3	1,392	- 4.5
+ 5.8	603	+ 4.5
+21.8	460	+ 9.0
+13.4	295	+ 5.0
+12.8	145	+ 3.5
+28.9	132	- 4.7
+27.4	123	-22.0
+57.5	114	+13.2
+ 4.8	85	- 2.8
- 8.9	72	- 5.8
+ 1.9	56	+ 2.6
+20.0	134	+ .1

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period, raising the NASA ap-
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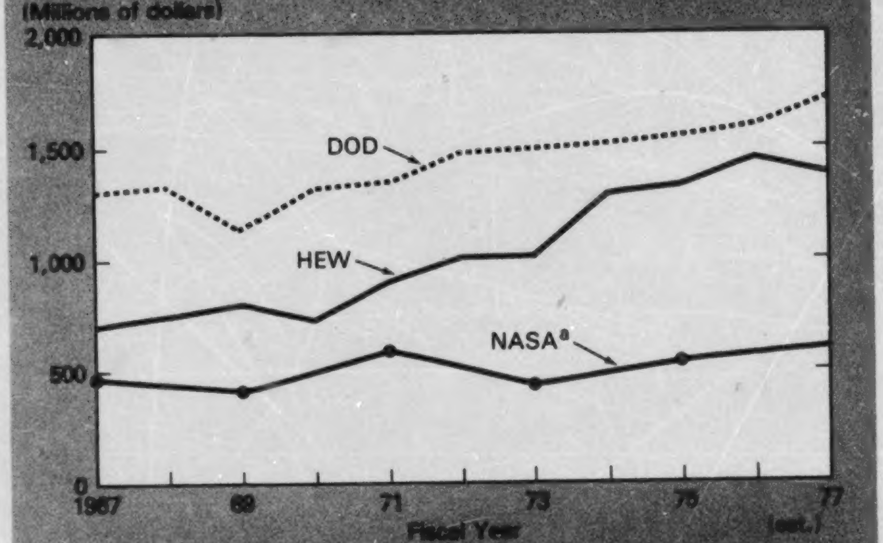
are also concerned with earth
and weather monitoring, and

- The applied research increase planned by ERDA for 1977 is second highest of all agencies, and the 1977 funding level is more than four times that of 1967. In 1977 ERDA accounts for 9 percent of the Federal applied research total. Research is mainly concerned with fusion power, environmental problems, and electrical energy systems and energy storage.

- USDA sponsorship of applied research has grown steadily throughout the 1967-77 decade, much of it for work sponsored by the Agricultural Research Service or by the Cooperative State Research Service in support of agricultural experiment stations. The USDA share of all Federal applied research has increased to an estimated 6 percent in 1977, compared with 5 percent in most earlier years.

Trends in Federal obligations for applied research, by agency



[a]Prior-year data for fiscal years 1968, 1970, 1972, and 1974 are not currently available on a comparable basis pending revision by NASA of applied research totals for those years.

SOURCE: National Science Foundation

- The Commerce level of support for applied research in 1977 is four times greater than the 1967 level. In 1977 Commerce will provide an estimated 3 percent of the Federal applied research total. Recent growth can be attributed to expansion of National Oceanic and Atmospheric Administration (NOAA) programs.

- Several agencies with shares of total at the 2-percent level or less are notable for recent applied research growth. Interior, after major growth from 1967 to 1976, is scheduled for a dollar decrease in 1977. EPA also is scheduled to decrease support in 1977, after growth between 1970 and 1976. The decline can be attributed to the completion of programs directed towards establishing energy assessment criteria. NRC funding for applied research, however, is scheduled for a precipitous increase in the current (1975-77) period, the result of growth in each of the NRC programs—reactor safety research, environmental and fuel cycle research, and safeguards research. NSF is scheduled to reduce funds for applied research between 1975 and 1977, mainly the result of the completion or transfer to ERDA of several energy-related programs within RANN.

Performers

- The Federal intramural sector is the chief one for applied research performance. In 1977 this sector is expected to account for 37 percent of the Federal applied research total, compared with 35 percent in 1967.

- Intramural performance of applied research has almost doubled between 1967 and 1977, chiefly supported by the program activities of DOD, NASA, HEW, and USDA. Even though HEW is scheduled for a decrease in applied research in 1977, this will be more than offset by the planned increases for DOD, NASA, and USDA. The four agencies are expected to support nearly four-fifths of intramural performance in 1977.

- Industrial firms (including FFRDC's) are the next largest sector for applied research performance, accounting for a 29-percent share of the Federal applied research total in 1977, compared with 31 percent in 1967. In the late sixties, applied research performance by this sector dropped significantly, then fluctuated, but the current (1975-77) period shows steady growth.

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ERDA is important to the recent ris
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- The share of support for applied
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- HEW is the major support agency,
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HEW accounted for almost two-th
ERDA also reflected substantial i

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[Dollars in

Performer	Actual
	1975
Total	$4,783
Federal intramural	1,768
Industrial firms[1]	1,303
Universities and colleges	1,039
FFRDC's administered by universities	216
Other nonprofit institutions[1]	354
Other performers	104

[1] Includes Federally Funded Research and Developm

Source: National Science Foundation

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applied research. Between 1967 and 1977, however, NASA, the second largest source, has decreased dollar support by approximately one-half. ERDA is important to the recent rise in industrial performance of Federal applied research, having increased funds for this sector more than three times since 1974. ERDA will account for an estimated 9 percent of the total in 1977, compared with 3 percent in 1967.

- The share of support for applied research at universities and colleges shows a decrease in each year of the current period, dropping from 22 percent of the applied research total in 1975, to 20 percent in 1977, the last drop resulting mainly from a lower dollar total.

- HEW is the major support agency, providing currently about two-thirds of the funds to universities and colleges and accounting for the overall dollar decrease in 1977. Between 1967 and 1977, when performance of federally supported applied research by this sector almost doubled, HEW accounted for almost two-thirds of the total increase. USDA and ERDA also reflected substantial increases in the same period.

Federal obligations for applied research, by performer

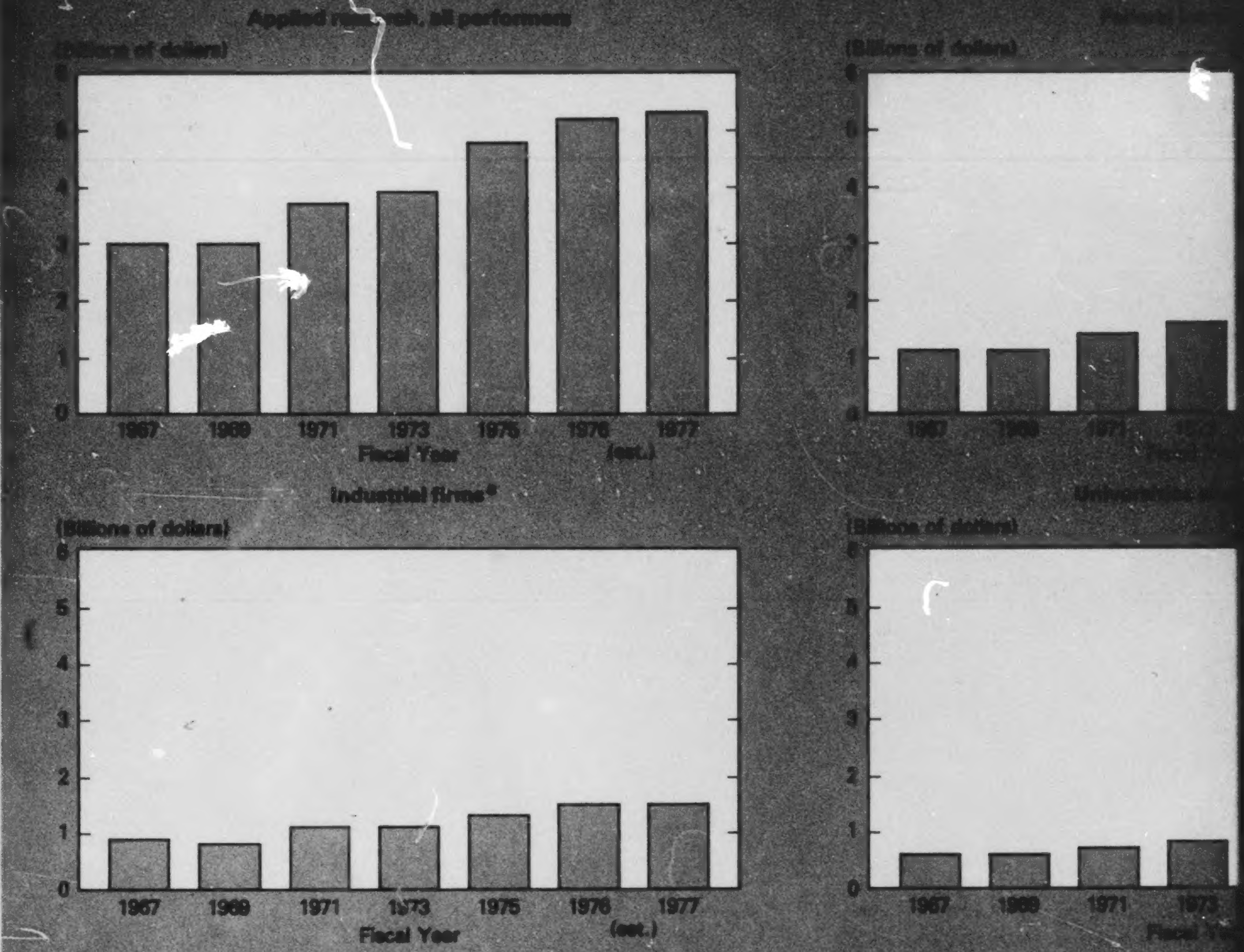
[Dollars in millions]

Performer	Actual	Estimates			
	1975	1976	Percent change 1975-76	1977	Percent change 1976-77
Total	$4,783	$5,223	+ 9.2	$5,331	+ 2.1
Federal intramural	1,768	1,898	+ 7.4	1,949	+ 2.7
Industrial firms[1]	1,303	1,465	+12.4	1,535	+ 4.8
Universities and colleges	1,039	1,103	+ 6.1	1,081	- 2.0
FFRDC's administered by universities	216	246	+14.1	268	+ 9.1
Other nonprofit institutions[1]	354	385	+ 8.8	376	- 2.4
Other performers	104	126	+21.3	122	- 3.3

[1] Includes Federally Funded Research and Development Centers (FFRDC's) administered by this sector.

Source: National Science Foundation

Federal obligations for applied research, by major performer:
selected fiscal years 1967-77

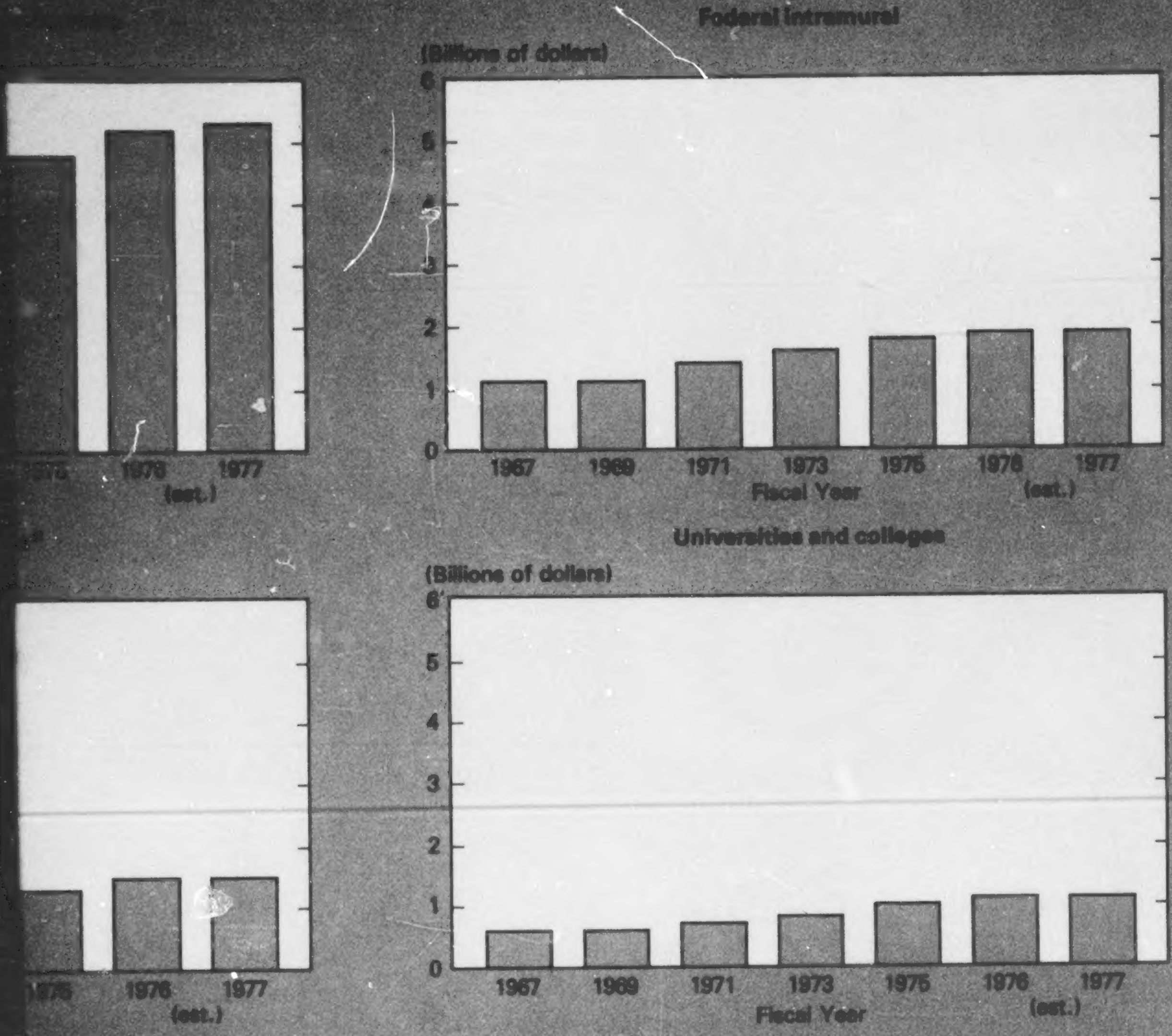


*Includes Federally Funded Research and Development Centers (FFRDC's).

NOTE: Prior-year data for fiscal years 1968, 1970, 1972, and 1974 are not currently available on a comparable basis pending revision by NASA of applied research totals for those years.

SOURCE: National Science Foundation

for applied research, by major performer: selected fiscal years 1967-77



enters (FFRDC's).

1974 are not currently available on a
search totals for those years.

Fields

- Between 1967 and 1977 engineering has been the leading field in Federal applied research support, making up 43 percent of the applied research total in 1967 and an estimated 38 percent in each year of the current 1975-77 period. DOD and NASA have been the chief sources of support, but in the current period ERDA, Interior, and especially NRC, make important contributions to the scheduled growth for this field.

- The life sciences, second in Federal applied research support, reflect strong growth until 1977 when a slight decline is anticipated. The share for the life sciences in the Federal applied research total is estimated at 34 percent in 1977 down from 35 percent in 1975 and 1976, compared with 28 percent in 1967. HEW, the key source of support for the life sciences, accounts for almost two-thirds of the total in 1977. USDA accounts for an estimated one-tenth. ERDA has also become an important support agency, growing from a 1-percent share to a 9-percent share between 1967 and 1977.

- The physical sciences have shown little dollar growth over the 1967-77 decade. The physical science share of the total Federal applied research effort was 12 percent in 1967 but will be an estimated 9 percent in each year of the current period. ERDA and DOD are expected to be the leading sources of support in 1977. DOD, once the lead agency, has decreased funding in the 1967-77 decade so that support is expected to be below the 1967 funding level in 1977. Thus, ERDA is scheduled to be the primary source of support to the physical sciences, providing two-fifths of the Federal total in 1977.

- Environmental sciences are found to represent between 6 percent and 7 percent of the Federal applied research total in the current period (1975-77). Support to this field has increased as a result of the growth of NASA programs. NASA is expected to provide more than two-fifths of the 1977 total for applied research in the environmental sciences, substantially more than the 1967 share of nearly one-third. DOD, the lead agency in 1967, is expected to provide somewhat more than one-fifth of the total in 1977.

- Support for applied research i
doubled since 1967, and the soci
research effort has increased from
1975, 1976, and 1977. HEW curre
support for social sciences, follo

- Mathematics and psychology will
the Federal funding for applied re
as in 1967. DOD and HEW will con
for psychology, and DOD, the pri

Federal obligations for applied

[Dollars in

Field of science	
	1967
Total	$2,965
Life sciences	830
Psychology	48
Physical sciences	355
Astronomy	12
Chemistry	119
Physics	197
Other	26
Environmental sciences	173
Atmospheric	81
Geological	62
Oceanography	30
Other	–
Mathematics	65
Engineering	1,271
Social sciences	131
Other sciences	92

Source: National Science Foundation

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third. DOD, the lead agency in
ore than one-fifth of the total in

- Support for applied research in the social sciences has more than doubled since 1967, and the social science share of the Federal applied research effort has increased from 4 percent to an estimated 5 percent in 1975, 1976, and 1977. HEW currently provides nearly two-fifths of the support for social sciences, followed by USDA with less than one-fifth.

- Mathematics and psychology will each receive an estimated 2 percent of the Federal funding for applied research in the current period, the same as in 1967. DOD and HEW will continue to be the chief sources of support for psychology, and DOD, the principal agency to support mathematics.

Federal obligations for applied research, by field of science

[Dollars in millions]

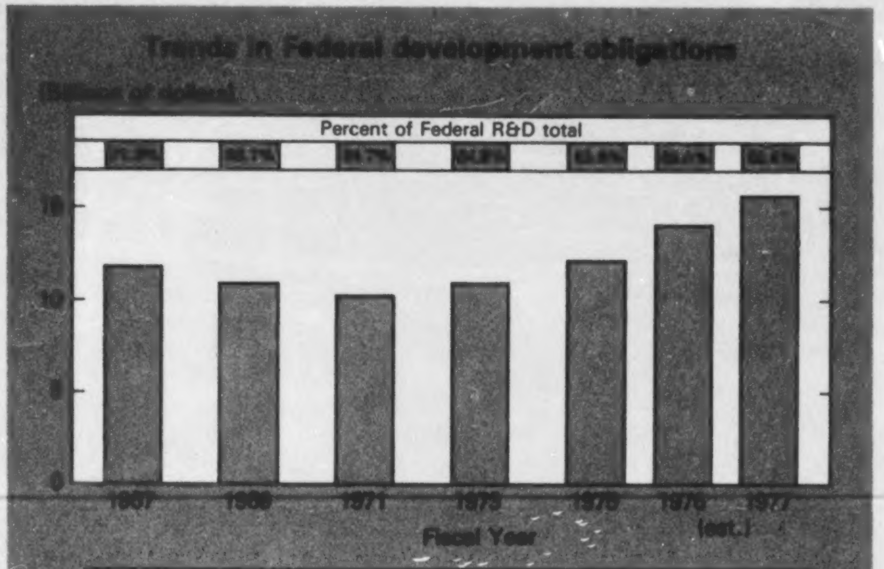
Field of science	Actual		Estimates	
	1967	1975	1976	1977
Total	$2,965	$4,783	$5,223	$5,331
Life sciences	830	1,674	1,832	1,790
Psychology	48	85	82	84
Physical sciences	355	409	444	476
Astronomy	12	7	5	5
Chemistry	119	129	141	136
Physics	197	239	259	278
Other	26	34	39	56
Environmental sciences	173	322	336	355
Atmospheric	81	153	164	171
Geological	62	55	55	56
Oceanography	30	49	52	54
Other	–	65	66	76
Mathematics	65	78	81	84
Engineering	1,271	1,813	1,971	2,040
Social sciences	131	231	277	284
Other sciences	92	172	200	219

Source: National Science Foundation

Section 3: DEVELOPMENT

- Federal obligations for development are expected to increase from $12.1 billion in 1975 to $14.1 billion in 1976, and to an estimated high of $15.6 billion in 1977. The 1977 increase of 11 percent is expected to run ahead of inflation for the second consecutive year.

- Even though the 1977 total is a record high, when converted to constant dollars, the level of effort is 26 percent less than 1967.



Trends in Federal development obligations

Average Annual Percent Change		
1967-75	1975-76	1976-77
.3	16.0	11.2

NOTE: Prior year data for fiscal years 1968, 1970, 1972, and 1974 are not currently available on a comparable basis pending revision by NASA of development totals for those years.
SOURCE: National Science Foundation

- The share of development in the Fed
of the current (1975-77) period—fr
1976 to 67 percent in 1977. Neverth
reflecting the greater influence o
Federal R&D total at that time.

Agencies

- DOD, NASA, and ERDA together a
of the total Federal development e
cent in 1967. The shift is attributab
level of funding for development a
other agencies, notably HEW, EPA,

- The DOD dollar increase for develo
agency in 1977. DOD has been the
Federal development programs thr
ing 55 percent of the total in 1967
The Navy is expected to undertake t
will include work on the F-18 air co
missile, the Trident submarine-laun
ships, and the fleet ballistic missile
lower than that of the Navy, will c
air-launched cruise missile, the M
system, the SAM-D air defense sys
plans support for development of
AAH advanced attack helicopter,
range air defense system, the ballist
program, and the BMD advanced te

- NASA, the second largest support
reflect a slight increase in 1977, p
space shuttle program. The NASA
fallen from 34 percent in 1967 to a
with increased dollar support in the
declined as other agencies have i
Most work for NASA in this area
program with its many component

- The share of development in the Federal R&D effort has risen in each year of the current (1975-77) period—from 64 percent in 1975 to 65 percent in 1976 to 67 percent in 1977. Nevertheless, the 1967 share was 72 percent, reflecting the greater influence of DOD and NASA programs on the Federal R&D total at that time.

Agencies

- DOD, NASA, and ERDA together are expected to account for 92 percent of the total Federal development effort in 1977, compared with 96 percent in 1967. The shift is attributable to a substantial drop in the NASA level of funding for development and to increasing levels of support by other agencies, notably HEW, EPA, and DOT.

- The DOD dollar increase for development is the largest for any Federal agency in 1977. DOD has been the most important support agency for Federal development programs throughout the 1967-77 decade, providing 55 percent of the total in 1967 and an estimated 59 percent in 1977. The Navy is expected to undertake the largest development effort, which will include work on the F-18 air combat fighter, the sea-launched cruise missile, the Trident submarine-launched ballistic missile, surface effect ships, and the fleet ballistic missile system. The Air Force effort, slightly lower than that of the Navy, will cover the F-16 air combat fighter, the air-launched cruise missile, the M-X intercontinental ballistic missile system, the SAM-D air defense system, and the B-1 bomber. The Army plans support for development of the UTTAS tactical transport, the AAH advanced attack helicopter, the XM-1 tank, the Roland II short-range air defense system, the ballistic missile defense system technology program, and the BMD advanced technology program.

- NASA, the second largest support agency for development work, will reflect a slight increase in 1977, primarily for the continuation of the space shuttle program. The NASA share of the development total has fallen from 34 percent in 1967 to an estimated 17 percent in 1977. Even with increased dollar support in the current period, the NASA share has declined as other agencies have increased their development efforts. Most work for NASA in this area is now focused on the space shuttle program with its many component programs.

Federal obligations for development, by agency

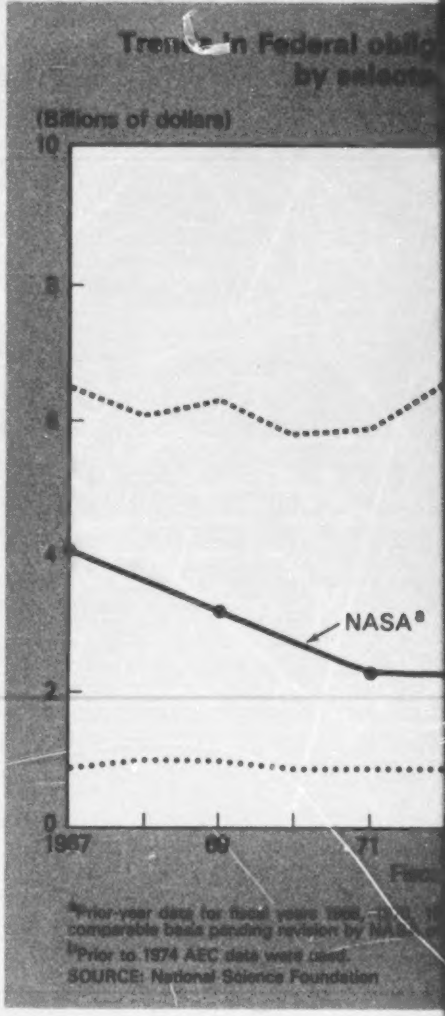
[Dollars in millions]

Agency	Actual	Estimates			
	1975	1976	Percent change 1975-76	1977	Percent change 1976-77
Total	$12,115	$14,056	+16.0	$15,637	+11.2
Department of Defense	7,219	8,055	+11.6	9,214	+14.4
National Aeronautics and Space Administration	2,277	2,627	+15.4	2,688	+ 2.3
Energy Research and Development Administration	1,479	2,108	+42.5	2,531	+20.1
Department of Health, Education, and Welfare	449	474	+ 5.6	475	+ .2
Department of Transportation	258	317	+23.2	295	- 6.9
Environmental Protection Agency	116	134	+15.8	106	-21.0
Other agencies	317	341	+ 7.5	328	- 3.7

Source: National Science Foundation

- ERDA will continue to reflect rapid growth in 1977, showing the largest relative increase among all the agencies. The dollar increase for ERDA development programs is second only to that of DOD. The ERDA share of the Federal development total has grown from 7 percent in 1967 to an estimated 16 percent in 1977. Development activities will be found in most ERDA programs, including solar energy, fusion power, fission power, fuel cycle, end-use conservation, weapons activities, and also reactor safety—a new program in 1977.

- The 8-percent share represented by the remaining agencies in 1977 is made up chiefly of HEW, DOT, and EPA development undertakings. HEW has greatly increased its development efforts compared with 1967, both in the health and education fields, but reflects only a slight increase in 1977, for support of development programs in education. The energy-related development efforts of EPA show a decrease in 1977 after significant increases in 1976, largely because of expected completion of energy-related environmental assessment programs. DOT, another agency that has supported a number of development efforts, also shows a decrease in 1977, mainly from decreased activities of the Federal Railroad and Federal Highway Administrations.



[b]Prior to 1974 AEC data were used.
SOURCE: National Science Foundation

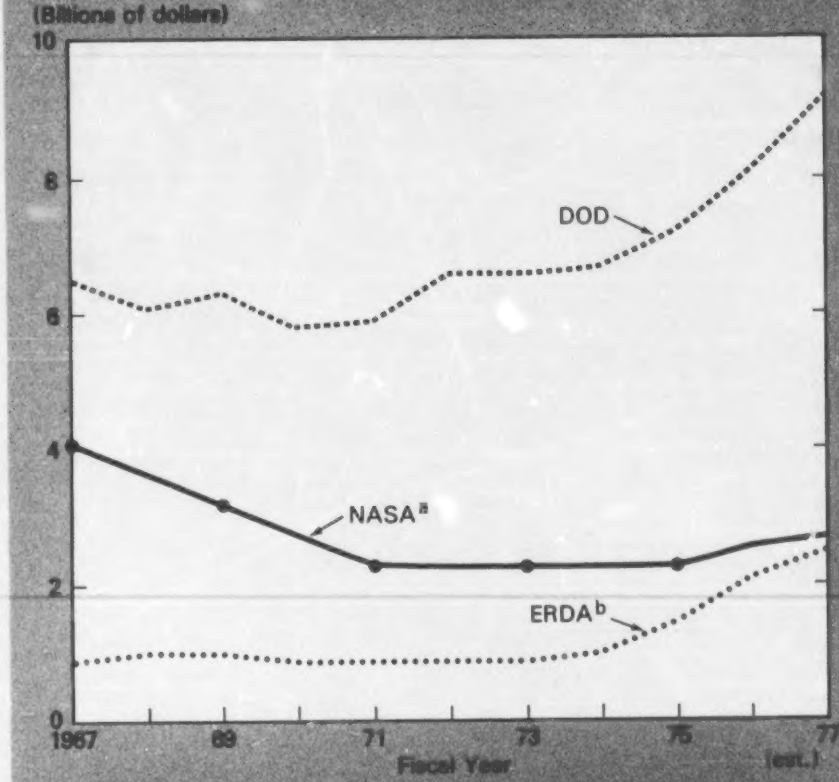
by agency

Percent change 1975-76	1977	Percent change 1976-77
Estimates		
+16.0	$15,637	+11.2
+11.6	9,214	+14.4
+15.4	2,688	+ 2.3
+42.5	2,531	+20.1
+ 5.6	475	+ .2
+23.2	295	- 6.9
+15.8	106	-21.0
+ 7.5	328	- 3.7

in 1977, showing the largest he dollar increase for ERDA t of DOD. The ERDA share of from 7 percent in 1967 to an t activities will be found in ergy, fusion power, fission weapons activities, and also

maining agencies in 1977 is development undertakings. efforts compared with 1967, reflects only a slight increase ms in education. The energy-decrease in 1977 after signifi-pected completion of energy-s. DOT, another agency that orts, also shows a decrease in he Federal Railroad and Fed-

Trends in Federal obligations for development by selected agencies

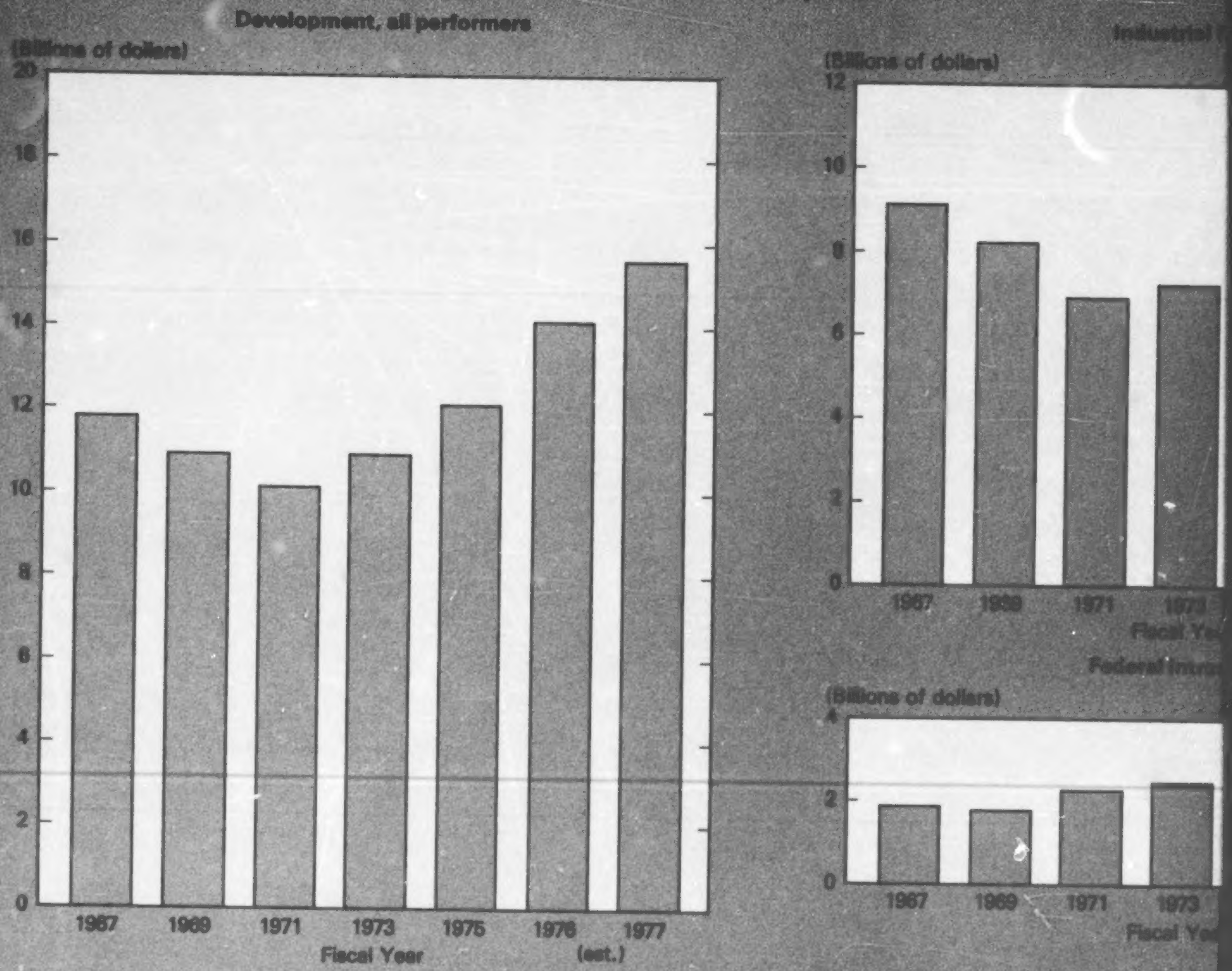


[a]Prior-year data for fiscal years 1968, 1970, 1972, and 1974 are not currently available on a comparable basis pending revision by NASA of development totals for those years.

[b]Prior to 1974 AEC data were used.

SOURCE: National Science Foundation

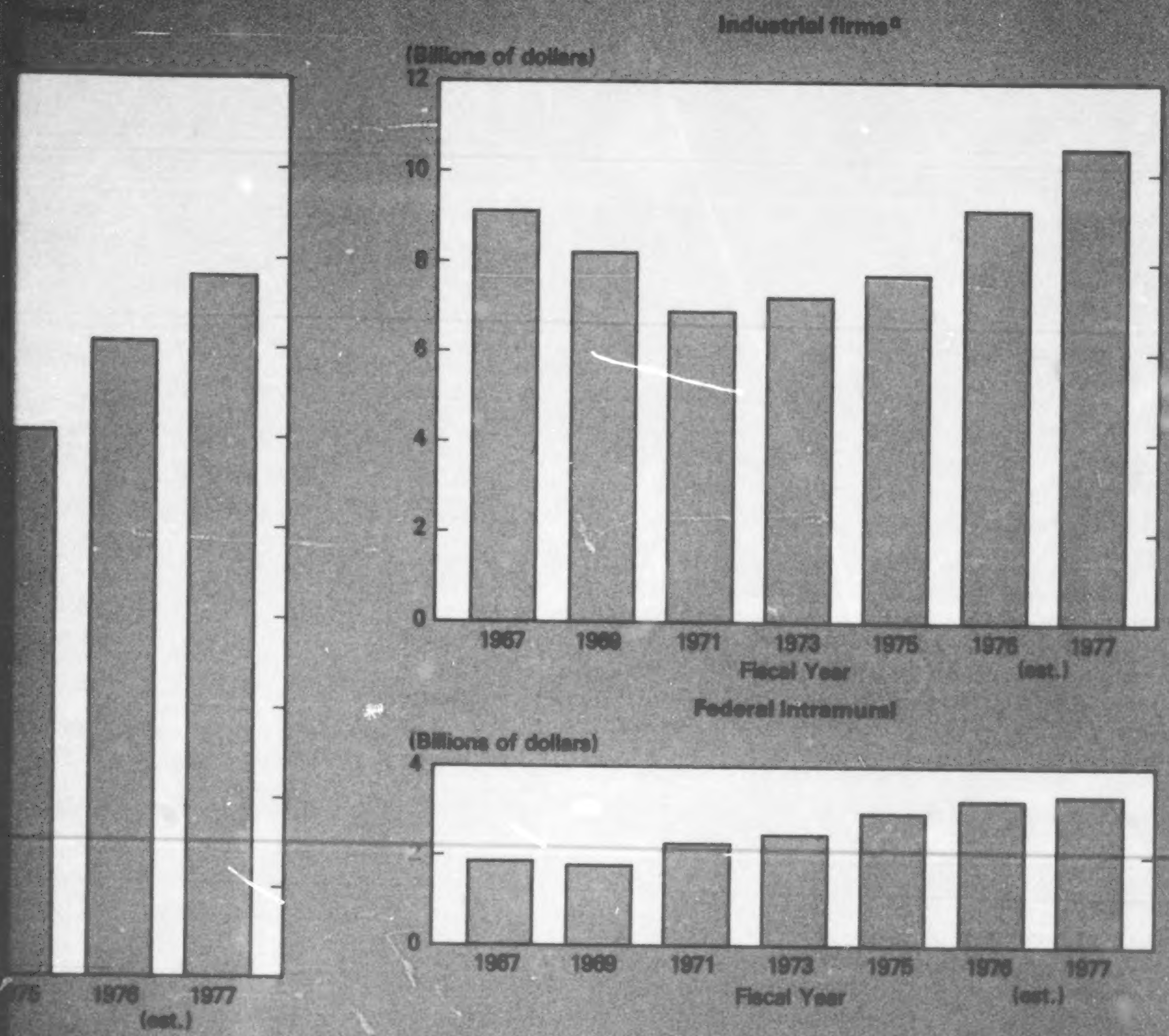
Federal obligations for development, by major performer: selected fiscal years 1967-77



SOURCE: National Science Foundation

[a]Includes Federally Funded Research and Developme
NOTE: Prior-year data for fiscal years 1969, 197
comparable basis pending revision by NASA of d
Universities and colleges totals did not exceed $300

obligations for development, by major performer:
selected fiscal years 1967-77



[a] Includes Federally Funded Research and Development Centers (FFRDC's).

NOTE: Prior-year data for fiscal years 1968, 1970, 1972, and 1974 are not currently available on a comparable basis pending revision by NASA of development totals for those years.

Universities and colleges totals did not exceed $300 million in any year.

Performers

- Industrial firms have been the primary performers of Federal development work throughout the 1967-77 decade. However, the industrial sector, which accounted for 77 percent of the development total in 1967, had dropped in 64 percent of the total by 1975. The drop between 1967 and 1975 is largely attributable to NASA which, by 1975, had reduced support to less than one-half of the 1967 level as the Apollo program completed its cycle. In 1977 support for industrially performed development work is expected to reach an alltime high of $10.6 billion, and the share of this work in the Federal development total is expected to rise to 68 percent. The rise is derived from ongoing DOD and ERDA programs and new growth on the part of NASA. DOD is expected to sponsor 62 percent of the effort, NASA, 18 percent, and ERDA, 18 percent.

- As a share of the Federal development total, intramural performance is expected to account for 22 percent in 1977. Intramural performance represented 16 percent of the total in 1967 and had increased to 25 percent by 1975. Most of the increase is attributable to DOD, which is expected to sponsor more than two-thirds of the intramural development total in 1977 with NASA expected to account for approximately one-fifth. ERDA, although accounting for only 3 percent of intramural development performance in 1977, has more than doubled such support since 1974.

- The remaining performing sectors, universities and colleges, FFRDC's administered by universities, other nonprofit institutions, and State and local governments, will account for approximately 10 percent of the Federal development effort in 1977. In 1967 they represented 4 percent. Much of the growth can be attributed to increased DOD and ERDA support of FFRDC's administered by universities and increased HEW support for development efforts at universities and colleges and other nonprofit institutions.

Federal obligations for de

[Dollars in

Performer	Actual
	1975
Total	$12,115
Federal intramural	2,983
Industrial firms[1]	7,706
Universities and colleges	298
FFRDC's administered by universities and colleges	514
Other nonprofit institutions[1]	482
Other performers	132

[1] Includes Federally Funded Research and Develop

Source: National Science Foundation

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Federal obligations for development, by performer

[Dollars in millions]

Performer	Actual	Estimates			
	1975	1976	Percent change 1975-76	1977	Percent change 1976-77
Total	$12,115	$14,056	+16.0	$15,637	+11.2
Federal intramural	2,983	3,333	+11.7	3,384	+ 1.5
Industrial firms[1]	7,706	9,186	+19.2	10,611	+15.5
Universities and colleges	298	309	+ 3.8	319	+ 3.3
FFRDC's administered by universities and colleges	514	588	+14.4	667	+13.5
Other nonprofit institutions[1]	482	476	- 1.4	481	+ 1.1
Other performers	132	165	+24.4	175	+ 6.4

[1] Includes Federally Funded Research and Development Centers (FFRDC's) administered by this sector.

Source: National Science Foundation

Section 6. GEOGRAPHIC DISTRIBUTION, 1975

In 1963, 1965, and 1968, and annually since then data have been collected on the geographic distribution of Federal R&D funds.

For 1975, $18.5 billion in Federal R&D obligations were reported by 10 participating agencies, representing more than 97 percent of the Federal R&D effort. These agencies also reported $801 million for R&D plant.

Data are given on a prime contract basis, although additional data were obtained from NASA on the effects of first-tier subcontracting in 1975. Indications from the NASA data are that if subcontracting is taken into account, the dispersion of funds is greater than the pattern shown in the following pages.

Synopsis

- In 1975 every State and the District of Columbia received Federal R&D support. California received the largest amount—$4.8 billion, and South Dakota the smallest amount—$6.4 million.
- Four States—California, Maryland, Massachusetts, and New York—each received more than $1 billion in Federal R&D support in 1975.
- Eight States, including the District of Columbia,[9] were recipients of Federal R&D funds in the $500 million-to-$1 billion category.
- Thirteen States received from $100 to $500 million in Federal funds for R&D purposes in 1975.
- Eighteen States reflected support levels between $25 million and $100 million, and eight received support at levels below $25 million.

- In 1975 a total of 40 States, inclu
larger amounts of support than in
Columbia, received increases in 1
- Eleven States were reported a
between 1974 and 1975, a smalle

Distribution of total F
by State

MOUNTAIN
WEST NORTH C
PACIFIC
ALASKA
HAWAII
WEST SOUTH CENTRAL

SOURCE: National Science Foundation

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[9] In analyses of the geographic distribution of Federal R&D obligations the District of Columbia is considered a State.

DISTRIBUTION, 197

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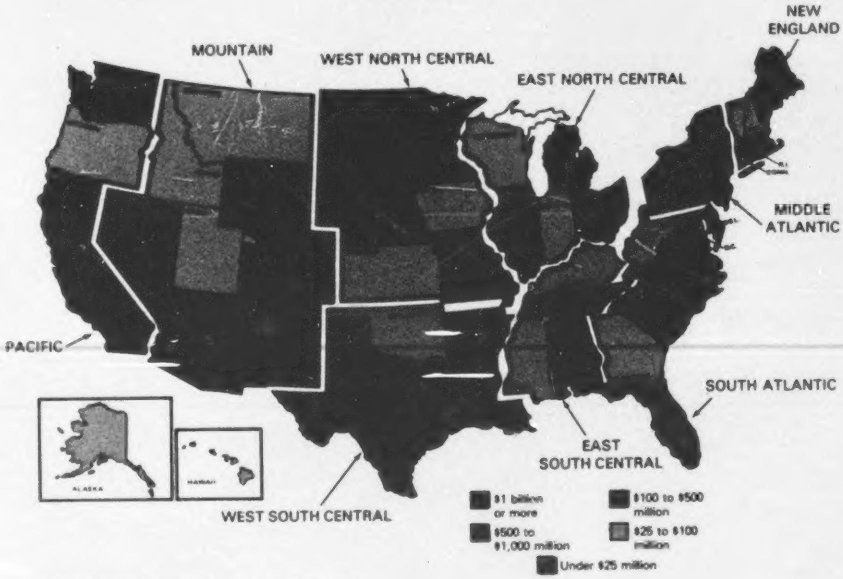
- In 1975 a total of 40 States, including the District of Columbia, received larger amounts of support than in 1974. Only 33, including the District of Columbia, received increases in 1974 over 1973.

- Eleven States were reported as declining in Federal R&D support between 1974 and 1975, a smaller number than in the previous year.

Distribution of total Federal R&D obligations by State: FY 1975


NEW ENGLAND
MOUNTAIN
WEST NORTH CENTRAL
EAST NORTH CENTRAL
MIDDLE ATLANTIC
PACIFIC
SOUTH ATLANTIC
EAST SOUTH CENTRAL
WEST SOUTH CENTRAL
ALASKA
HAWAII
$1 billion or more
$100 to $500 million
$500 to $1,000 million
$25 to $100 million
Under $25 million

SOURCE: National Science Foundation

The Leading States

In 1975 the 10 leading States accounted for 70 percent of the Federal R&D total, compared with 69 percent in 1974, and 72 percent in 1965. In the entire period surveyed, the "leading 10" list has included California, Maryland, Massachusetts, New York, Florida, Pennsylvania, and Texas. Other States, namely New Jersey, New Mexico, Washington, Virginia, the District of Columbia, Missouri, and Ohio, have been among the top 10 States at some time during the 10 years data have been reported. Thus, the leaders are seen to have been drawn from a group of approximately 15 States.

California was, by far, the chief recipient of Federal R&D support in 1975 with more than $4.8 billion, or 26 percent, of the Federal R&D total. Until 1975 R&D support for California had remained below the 1965 high. Growth of $763 million in 1975, largest among all the States, can be attributed to increased support by most agencies. DOD showed the largest increase and was the largest support agency, providing 57 percent of the State R&D total. The DOD share was slightly lower, however, than in 1974 as other agencies such as NASA and ERDA increased support. Industrial performance accounted for more than two-thirds of the R&D total for California with most funding coming from DOD for work on the B-1 bomber, and site defense of the Minuteman and Trident missile systems, and from NASA for work on such programs as the space shuttle orbiter vehicle and engine, the Delta space vehicle, and the Pioneer, and the High Energy Astronomy Observatories. ERDA also showed a large increase for work carried out at the Liquid Metal Engineering Center, an industry-administered FFRDC. Although the industrial sector has continually accounted for the largest share of work throughout the 1965-75 period, total dollar support has dropped and support for intramural performance has grown. In 1975 the share of the Federal intramural sector remained at 15 percent. DOD has been the chief support agency for this sector. Federal R&D facilities in California include the Naval Electronics Laboratory, the Naval Weapons Center, the Pacific Missile Test Center (Navy), the Space and Missile Test Center (Air Force), the Ames Research Center (NASA), and the Flight Research Center (NASA). Universities and colleges have been increasingly used in California, chiefly by HEW and NSF. ERDA, however, has provided substantial funds for the Lawrence Berkeley Laboratory and the Stanford Linear Accelerator Center, two university-administered FFRDC's.

In 1975 **Maryland** received an increase of $80 million, raising the total to $1.6 billion, or 9 percent of the Federal R&D total. DOD accounted for 42 percent of the support to this State; HEW, showing the largest dollar increase, provided 30 percent; and NASA represented 17 percent. The Federal intramural sector, traditionally Maryland's largest performing area, grew further in 1975 and accounted for nearly two-thirds of the State R&D effort. Increases for Federal intramural performance w
DOT. Federal R&D facilities in Marylan
Health (HEW), the Goddard Space Flight
of Standards (Commerce), the Agricul
Naval Surface Weapons Center and Ai
wood Arsenal Laboratories (Army). In
accounted for more than one-fourth of the
chiefly DOD, NASA, and HEW, support
allotted a large portion of its funds to th
an FFRDC administered by industry.

Massachusetts showed a growth of $
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1975 was $1.2 billion, or 7 percent of the
with the largest increase, provided 71 pe
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attributable to DOD, the largest agency
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increase. DOD accounts for nearly four o
ral work in Massachusetts. University a
1975, and the share of this sector expan
1974. The Air Force Lincoln Laboratory
also reflected an increase. Nonprofit ins
1975, attributable to HEW and USDA.

Support for **New York** increased by $3
$1.1 billion, or 4 percent of the Federal R
HEW, 25 percent; and ERDA, 16 percent
consecutive year, in 1975, New York rose
ping below that level in 1973. Even so, th
the 1965 high, mainly because of lesseni
largest performing sector—industry.
accounted for three-quarters of the total
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completed. ERDA offset the decline some
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percent of the Federal R&D
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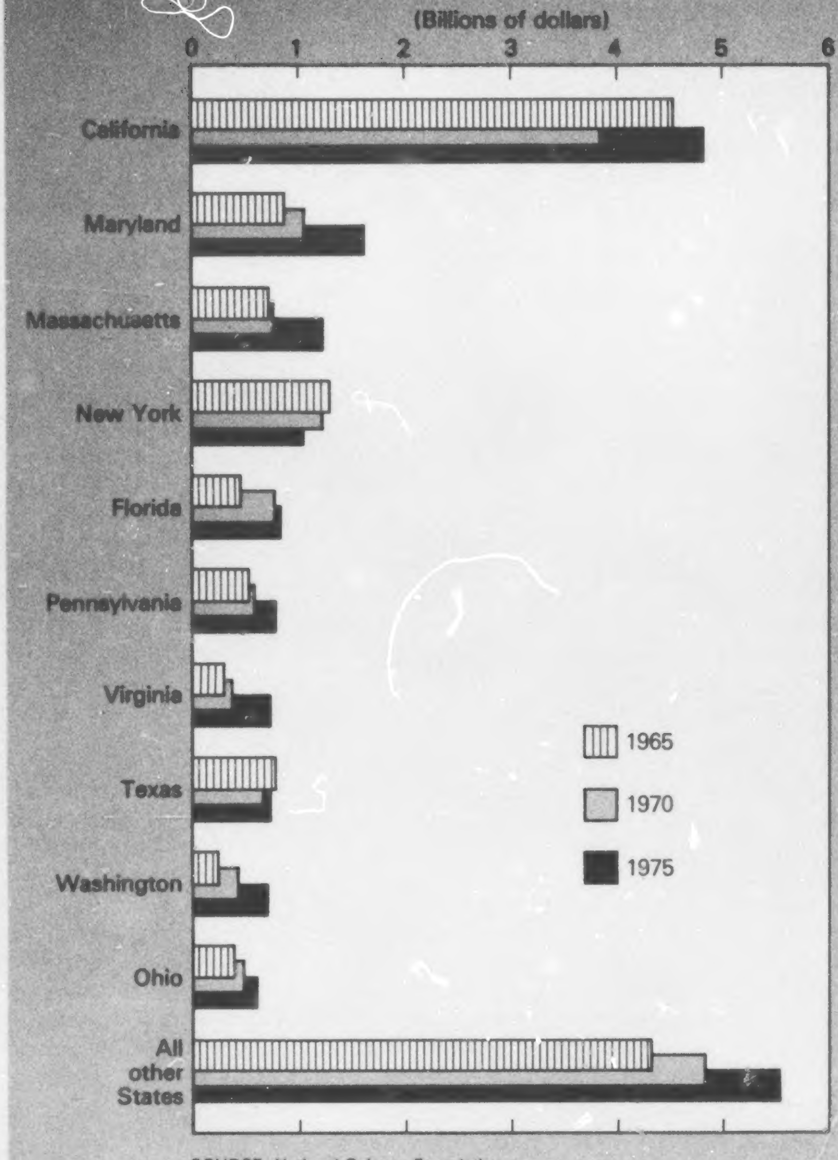
million, raising the total to
. DOD accounted for 42 per-
the largest dollar increase,
ercent. The Federal intramu-
rming area, grew further in
State R&D effort. Increases

for Federal intramural performance were reflected by all agencies except DOT. Federal R&D facilities in Maryland include the National Institutes of Health (HEW), the Goddard Space Flight Center (NASA), the National Bureau of Standards (Commerce), the Agricultural Research Center (USDA), the Naval Surface Weapons Center and Air Test Center (Navy), and the Edgewood Arsenal Laboratories (Army). Industrial performance in Maryland accounted for more than one-fourth of the R&D effort in 1975. All agencies, but chiefly DOD, NASA, and HEW, supported work by this sector. In 1975 HEW allotted a large portion of its funds to the Frederick Cancer Research Center, an FFRDC administered by industry.

Massachusetts showed a growth of $41 million in 1975, significantly less than the $235 million increase in 1974. The federally sponsored R&D total in 1975 was $1.2 billion, or 7 percent of the Federal R&D total nationwide. DOD, with the largest increase, provided 71 percent of the total, the same share as in 1974. The HEW level of support, dropping slightly, represented 13 percent in 1975. More than two-fifths of the federally supported R&D effort was directed to industrial firms in 1975, even though there was a dollar decrease attributable to DOD, the largest agency sponsor. Contracts by Interior offset this decrease somewhat. Federal intramural performance grew from one-sixth of the total in 1974 to one-fifth in 1975, largely because of a DOD increase. DOD accounts for nearly four out of five dollars for Federal intramural work in Massachusetts. University and college performance increased in 1975, and the share of this sector expanded to 18 percent from 15 percent in 1974. The Air Force Lincoln Laboratory, a university-administered FFRDC, also reflected an increase. Nonprofit institutions showed a slight decrease in 1975, attributable to HEW and USDA.

Support for **New York** increased by $33 million in 1975, bringing the total to $1.1 billion, or 4 percent of the Federal R&D total. DOD provided 44 percent; HEW, 25 percent; and ERDA, 16 percent of the overall support. For the second consecutive year, in 1975, New York rose above the $1 billion level after dropping below that level in 1973. Even so, the total for New York did not return to the 1965 high, mainly because of lessening use of and support for the State's largest performing sector—industry. In 1965 industrial performance accounted for three-quarters of the total State R&D effort that was federally supported; in 1975 industrial performance accounted for one-half. Both DOD and NASA have reduced funds significantly for industrial performance in New York, as the NASA Apollo-Soyuz Test Project phased down from the 1968 high to completion in 1975, and as many DOD aircraft contracts were completed. ERDA offset the decline somewhat by increasing support for work carried out at the Knolls Atomic Power Laboratory, an industry-administered FFRDC. On the other hand, important growth has been shown by the university and college sector. The academic share of the New York R&D total rose

Federal R&D support to the 10 States leading in such support in 1975 for selected years



SOURCE: National Science Foundation

from slightly more than one-tenth in
vided two out of three dollars for the
ERDA showed increased support. In
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Florida reflected an increase of $14 m
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operated facilities in Florida, except D
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In 1975 **Pennsylvania** received a $1
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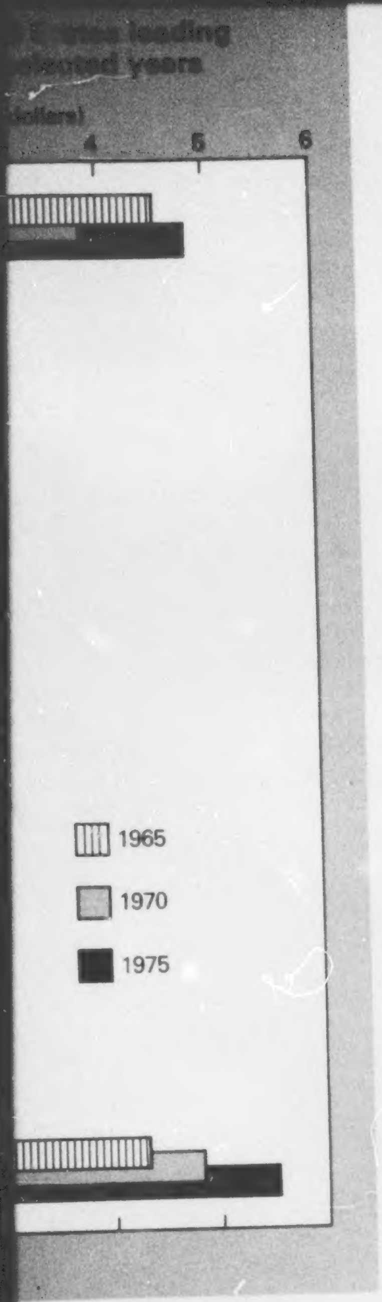
administered FFRDC. The Federal intr
reflected a 16-percent share. For the in
as did the Bureau of Mines (Interior),
NSF increased support. Nonprofit insti
State total, received funding almost en

In 1975 **Virginia** received an increas
$726 million, or 4 percent of Federal
largest increase, was the primary sourc
three-fifths of the Virginia total. NAS
provided more than one-fifth. Tradition
has accounted for most of the State R&D
than one-half in 1975. Most of the wor
Laboratories located at Fort Belvoir, a



vided two out of three dollars for the 1975 university and college effort, and ERDA showed increased support. Intramural performance, representing 8 percent of the Federal R&D total, showed an increase as most agencies expanded their intramural work.

Florida reflected an increase of $14 million in 1975, bringing the State total to $797 million, or 4 percent of all Federal R&D obligations. DOD made the largest contribution to the increase. DOD and NASA lead in R&D support to this State. Federal intramural performance became the leading form of R&D activity for the first time in the 1965-75 period, accounting for more than one-half of the Federal R&D support to Florida in 1975. That year all agencies that operated facilities in Florida, except DOT and NSF, increased support—the Navy for work on the Trident missile system, the Air Force for work on the fleet ballistic missile system at the Eastern Test Range, and NASA, for work on the beginning stages of the launch processing system for the space shuttle at Cape Canavaral. Industrial performance represented only two-fifths of the total in 1975, a lower share than formerly. Reduced contracts by the Army and the ending of the NASA Apollo-Soyuz Test Project contributed to the decrease.

In 1975 **Pennsylvania** received a $115 million increase, the second largest among all the States. The R&D total of $775 million for Pennsylvania, 4 percent of all Federal R&D obligations, was a record high. DOD remained the lead support agency but provided little more than one-third of the federally supported R&D total, compared with one-half in 1974. ERDA, however, nearly doubled support between 1974 and 1975, and also represented a one-third share in 1975. Of the federally supported R&D total in Pennsylvania, 59 percent was represented by industrial performance, sponsored chiefly by ERDA for work carried out at the Bettis Atomic Power Laboratory, an industry-administered FFRDC. The Federal intramural and the academic sectors each reflected a 16-percent share. For the intramural sector DOD reduced funding, as did the Bureau of Mines (Interior), but for the academic sector HEW and NSF increased support. Nonprofit institutions, accounting for 7 percent of the State total, received funding almost entirely from DOD and ERDA.

In 1975 **Virginia** received an increase of $84 million, bringing the total to $726 million, or 4 percent of Federal R&D obligations. DOD, reflecting the largest increase, was the primary source of support, accounting for more than three-fifths of the Virginia total. NASA, the next largest support agency, provided more than one-fifth. Traditionally, Federal intramural performance has accounted for most of the State R&D effort, but it dropped to slightly more than one-half in 1975. Most of the work is sponsored by DOD for the Army Laboratories located at Fort Belvoir, and by NASA for work at the Langley presented almost two-fifths of the total in 1975. Contracts from DOD, Interior, and NSF provided the industrial sector with the largest dollar increase that year.

Texas received a $61 million increase in 1975, raising the total to $713 million, or 4 percent of the Federal R&D total nationwide. A larger increase would have been realized if NASA, the largest agency, providing 43 percent of the State R&D total in 1975, had not decreased support. DOD showed a large increase, bringing the share of this agency to 36 percent. The industrial sector accounted for more than one-half of the State R&D total, with one out of every two dollars provided by DOD (all three services). NASA, the next agency in industrial R&D support, sponsored programs that were performed by industrial contractors at the Johnson Space Flight Center, a NASA facility. Federal intramural performance accounted for almost one-third of the Texas total, with most funds provided by NASA. Support for universities and colleges increased slightly in 1975, accounting for 16 percent of the State total; nearly three-fifths of the support was contributed by HEW.

Distribution of Federal R&D obligations to the 10 States leading in such support in FY 1975 for selected years

[Dollars in millions]

State	1965	1970	1974	1975
Total, all States	$14, 357	$14,981	$16,991	$18,549
	Percent distribution			
California	31.7%	25.8%	24.0%	26.1%
Maryland	6.1	7.1	9.0	8.7
Massachusetts	5.1	5.1	7.0	6.6
New York	9.0	8.2	6.0	5.7
Florida	3.2	5.5	4.6	4.3
Pennsylvania	3.7	3.6	3.9	4.2
Virginia	2.0	2.4	3.8	3.9
Texas	5.1	4.3	3.8	3.8
Washington	1.5	2.8	3.8	3.7
Ohio	2.6	3.1	3.3	3.2
All other States[1]	30.0	32.1	30.8	29.8

[1] Includes outlying areas and offices abroad.

Note: Data are based on responses from agencies representing approximately 97 percent of the total Federal R&D effort.

Source: National Science Foundation

total to $694 million, or 4 percent of all F
accounted for the largest share of the to
largest increase, however, sponsoring 2
programs. Since 1965 industrial perform
The industry share in 1975 was more tha
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post, the A-10 aircraft, and the air-laun
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growth as well, attributable largely to E
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for universities and colleges and for
decreased in 1975.

Ohio received an increase of $18 milli
million, or 3 percent of all Federal R&D w
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DOD and NASA. Federal intramural per
performance in the 1965-75 period and
total in 1975. DOD sponsored most of thi
Patterson Air Force Base. NASA spons
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one-third of the total in 1975; a decrease
and NASA and was not offset by incre
Laboratory, an industry-administered F
colleges increased slightly in 1975.

In 1975 the **District of Columbia** an
twelfth, respectively, in R&D support; e
in Federal R&D funds. For the District o
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sored largely by DOD. For New Mexic
divided among the industrial and Fede
administered by universities. ERDA, th
the efforts conducted at the Sandia La
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White Sands Missile Range and the Air F
Air Force Base.

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e 10 States leading in such
ted years

1970	1974	1975
$14,981	$16,991	$18,549
Percent distribution		
25.8%	24.0%	26.1%
7.1	9.0	8.7
5.1	7.0	6.6
8.2	6.0	5.7
5.5	4.6	4.3
3.6	3.9	4.2
2.4	3.8	3.9
4.3	3.8	3.8
2.8	3.8	3.7
3.1	3.3	3.2
32.1	30.8	29.8

g approximately 97 percent of the total

Washington showed an increase of $44 million in 1975, raising the State total to $694 million, or 4 percent of all Federal R&D obligations. In 1975 DOD accounted for the largest share of the total—57 percent. ERDA showed the largest increase, however, sponsoring 26 percent of all federally supported programs. Since 1965 industrial performance has grown nearly four times. The industry share in 1975 was more than four-fifths of the State total, with work sponsored chiefly by DOD, and more specifically, by the Air Force, for the advanced warning and control system, the advanced airborne command post, the A-10 aircraft, and the air-launched cruise missile. Work was also supported by ERDA at the Hanford Engineering Development Laboratory, an FFRDC administered by industry. In 1975 nonprofit institutions showed growth as well, attributable largely to ERDA for work at the Pacific Northwest Laboratory, an FFRDC administered by a nonprofit institution. Support for universities and colleges and for Federal intramural performance decreased in 1975.

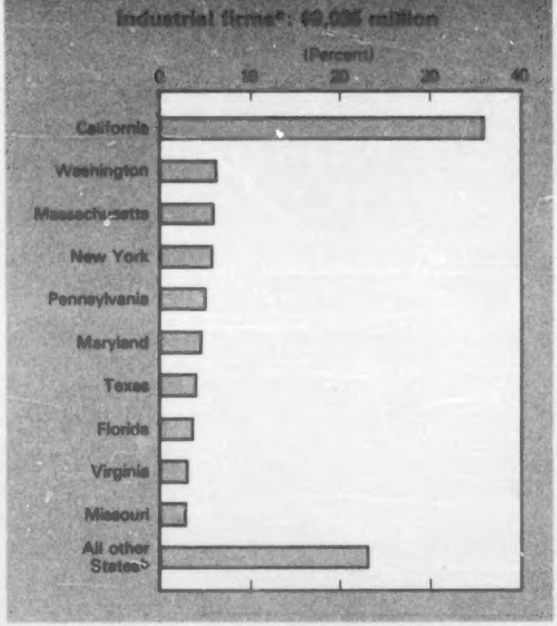
Ohio received an increase of $18 million in 1975, bringing the total to $586 million, or 3 percent of all Federal R&D work. Support for Ohio has fluctuated throughout the 1965-75 period mainly because of varying levels of support by DOD and NASA. Federal intramural performance outweighed other kinds of performance in the 1965-75 period and accounted for one-half of the State total in 1975. DOD sponsored most of this work at laboratories at the Wright-Patterson Air Force Base. NASA sponsored most of the rest, chiefly at the Lewis Research Center. Industrial performance made up slightly more than one-third of the total in 1975; a decrease from 1974 was attributable to DOD and NASA and was not offset by increased ERDA activities at the Mound Laboratory, an industry-administered FFRDC. Support to universities and colleges increased slightly in 1975.

In 1975 the **District of Columbia** and **New Mexico** were eleventh and twelfth, respectively, in R&D support; each received almost as much as Ohio in Federal R&D funds. For the District of Columbia, Federal intramural performance accounted for nearly three-quarters of the R&D total and was sponsored largely by DOD. For New Mexico R&D support was about equally divided among the industrial and Federal intramural sectors and FFRDC's administered by universities. ERDA, the largest support agency, sponsored the efforts conducted at the Sandia Laboratory, an industry-administered FFRDC and at the Los Alamos Scientific Laboratory, a university-administered FFRDC. DOD performed most intramural work at the Army White Sands Missile Range and the Air Force Weapons Laboratory at Kirtland Air Force Base.

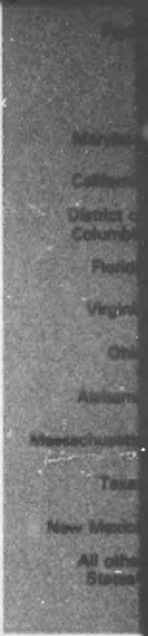
Division and State	1965	1970	1974	Net increase/ decrease 1965-74	1975	Net increase/ decrease 1974-75
Pacific	$4,849.0	$4,404.1	$4,864.3	+$ 15.3	$5,689.5	+$825.2
Alaska	14.4	43.2	25.3	+ 10.9	34.6	+ 9.3
California	4,553.3	3,871.1	4,075.7	- 477.6	4,838.8	+ 763.1
Hawaii	41.5	43.8	53.1	+ 11.6	43.0	- 10.1
Oregon	25.6	33.8	59.9	+ 34.3	76.6	+ 16.7
Washington	214.3	412.2	650.4	+ 436.1	694.5	+ 44.1
South Atlantic	2,154.9	2,899.2	3,752.8	+1,597.9	3,992.2	+ 239.4
Delaware	7.1	16.3	10.4	+ 3.3	10.0	- .4
District of Columbia	374.3	468.5	552.3	+ 178.0	581.3	+ 29.0
Florida	459.8	824.8	783.2	+ 323.4	797.0	+ 13.8
Georgia	58.4	72.3	70.9	+ 12.5	80.9	+ 10.0
Maryland	876.6	1,063.4	1,528.9	+ 652.3	1,609.3	+ 80.4
North Carolina	57.8	63.9	110.0	+ 52.2	117.2	+ 7.2
South Carolina	17.1	17.8	28.8	+ 11.7	24.5	- 4.3
Virginia	284.2	352.7	642.3	+ 358.1	726.1	+ 83.8
West Virginia	19.6	19.6	25.9	+ 6.3	46.0	+ 20.1
Middle Atlantic	2,228.6	2,516.9	2,160.2	- 68.4	2,276.9	+ 116.7
New Jersey	410.7	742.5	473.8	+ 63.1	442.2	- 31.6
New York	1,289.3	1,235.6	1,026.3	- 263.0	1,059.6	+ 33.3
Pennsylvania	528.7	538.8	660.1	+ 131.4	775.2	+ 115.1
New England	992.7	1,000.8	1,561.8	+ 569.1	1,651.2	+ 89.4
Connecticut	184.5	160.0	233.7	+ 49.2	269.9	+ 36.2
Maine	4.3	13.3	10.5	+ 6.2	11.8	+ 1.3
Massachusetts	733.7	760.9	1,188.3	+ 454.6	1,229.3	+ 41.0
New Hampshire	28.8	27.3	29.3	+ .5	33.6	+ 4.3
Rhode Island	37.5	29.9	74.9	+ 37.4	75.0	+ .1
Vermont	4.0	3.5	25.1	+ 21.1	31.5	+ 6.4
East North Central	923.7	1,038.8	1,263.8	+ 340.1	1,377.0	+ 113.2
Illinois	191.7	239.6	325.4	+ 133.7	371.6	+ 46.2
Indiana	71.9	91.9	95.0	+ 23.1	92.8	- 2.2
Michigan	155.2	162.8	196.6	+ 41.4	248.1	+ 51.5
Ohio	379.1	457.3	567.3	+ 188.2	585.5	+ 18.2
Wisconsin	125.8	87.1	89.6	- 46.2	79.0	- .6
Mountain	990.1	1,136.8	1,213.0	+ 222.9	1,274.8	+ 61.8
Arizona	76.6	72.8	99.5	+ 22.9	115.7	+ 16.2
Colorado	212.3	274.1	323.3	+ 111.0	266.8	- 56.5
Idaho	63.6	75.0	52.2	- 11.4	66.3	+ 14.1
Montana	8.6	11.6	13.6	+ 5.0	26.6	+ 13.0
Nevada	154.5	190.9	112.5	- 42.0	149.4	+ 36.9
New Mexico	425.3	444.1	532.0	+ 106.7	554.3	+ 22.3
Utah	45.0	61.1	68.7	+ 23.7	79.6	+ 10.9
Wyoming	4.2	7.2	11.0	+ 6.8	16.0	+ 5.0
West South Central	1,143.1	834.9	772.1	- 371.0	872.7	+ 100.6
Arkansas	6.6	9.8	14.2	+ 7.6	23.4	+ 9.2
Louisiana	377.1	146.5	75.7	- 301.4	101.7	+ 26.0
Oklahoma	28.4	29.5	29.9	+ 1.5	34.3	+ 4.4
Texas	731.0	649.1	652.2	- 78.8	713.4	+ 61.2
East South Central	628.3	599.7	726.7	+ 98.4	770.6	+ 43.9
Alabama	370.7	357.2	377.4	+ 6.7	363.3	- 14.1
Kentucky	17.1	20.4	31.3	+ 14.2	35.0	+ 3.7
Mississippi	36.7	28.3	76.3	+ 39.6	57.8	- 18.5
Tennessee	203.7	193.8	241.7	+ 38.0	314.4	+ 72.7
West North Central	408.7	475.4	607.4	+ 198.7	571.5	- 35.9
Iowa	28.8	32.7	46.5	+ 17.7	47.5	+ 1.0
Kansas	25.7	16.6	29.4	+ 3.7	32.9	+ 3.5
Minnesota	106.3	109.3	106.9	+ .6	123.1	+ 16.2
Missouri	231.7	291.2	387.0	+ 155.3	329.1	- 57.9
Nebraska	7.7	10.6	14.7	+ 7.0	20.0	+ 5.3
North Dakota	5.0	8.9	10.5	+ 5.5	12.6	+ 2.1
South Dakota	3.5	6.1	12.4	+ 8.9	6.4	- 6.0

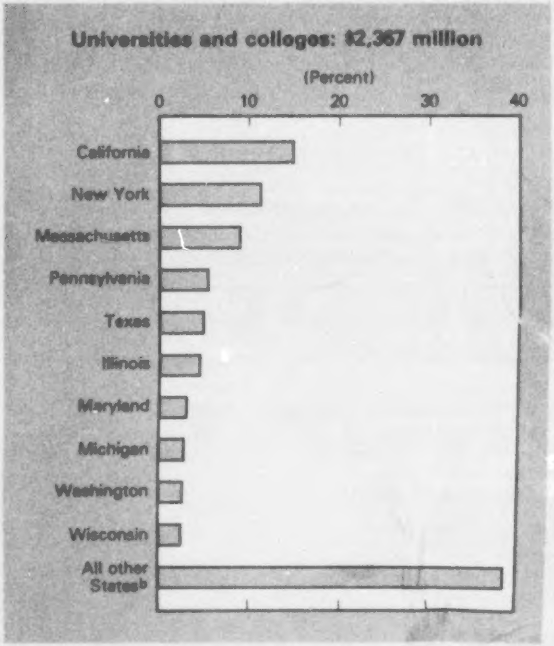
Source: National Science Foundation

The 10 States leading in Federal R&D support to performing sectors, FY 1975

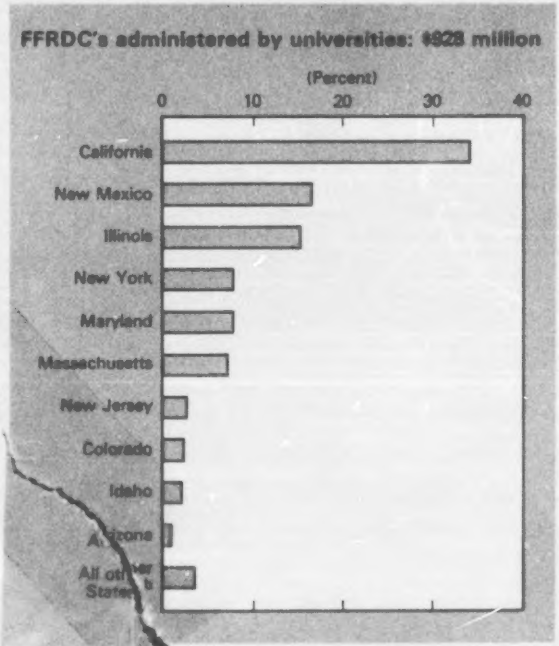


Industrial firms[a]: $9,035 million

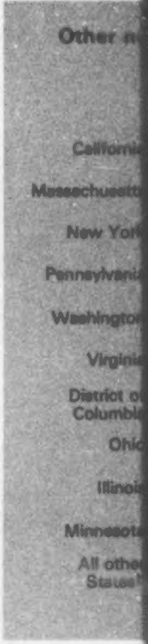




Universities and colleges: $2,367 million



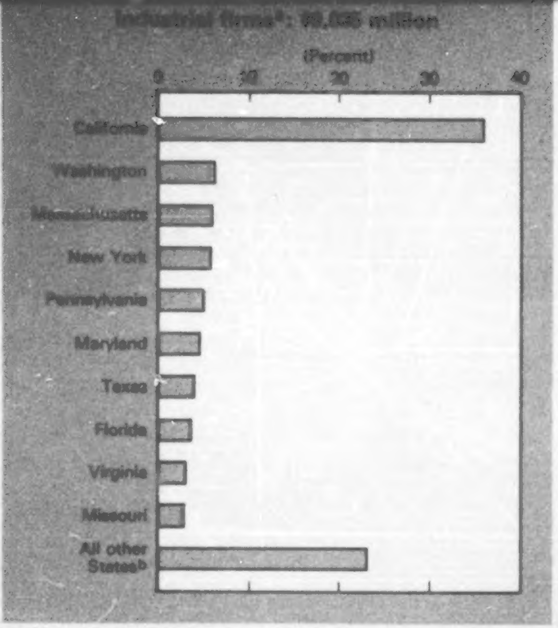
FFRDC's administered by universities: $928 million

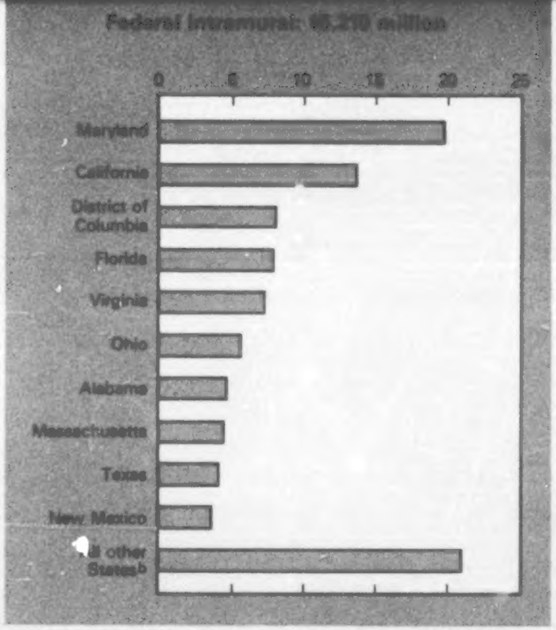


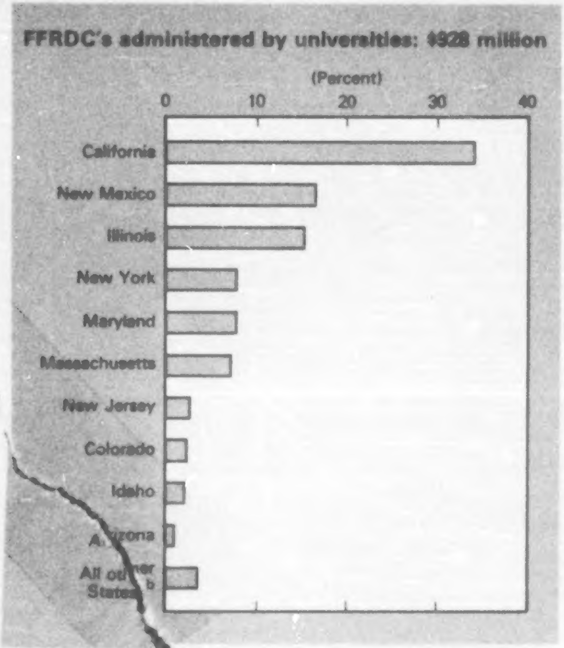
[a] Includes FFRDC's administered by this sector

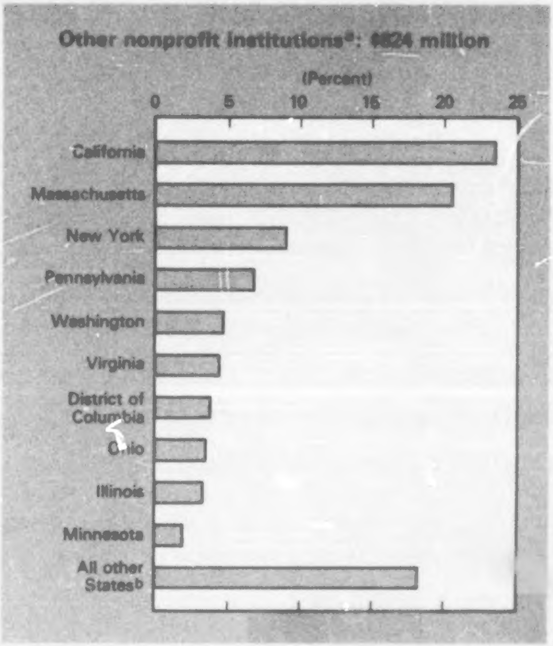
[b] Includes outlying areas and offices abroad

SOURCE: National Science Foundation


Industrial firms[a]: $9,035 million


Federal intramural: $5,210 million


FFRDC's administered by universities: $928 million


Other nonprofit institutions[a]: $824 million

Distribution of Funds by Performers

When States are compared by performing sectors, contrasting patterns of rank are shown. Federal agencies seeking certain kinds of research or development competence to implement their missions have turned to existing organizations with specialized capabilities within given States, and often agency support of these organizations has furthered the expansion of their operations.

INDUSTRIAL FIRMS

In 1975 nearly one-half of all Federal R&D obligations were directed to industrial firms (including FFRDC's), and 77 percent of this total was represented by 10 leading States. Because of the size of the contracts for industrial firms, it is not surprising that all of the 10 leading States for industrial performance, except Missouri, were among the 10 leading States in *total* Federal R&D support.

In 1975, for the first time, the two leading States for industrial R&D performance were located in the same section of the United States. California and Washington together accounted for more than two-fifths of the total of federally sponsored industrial R&D performance. Industry in these States met the needs of the three largest Federal R&D program areas—defense, space, and energy. The next three States—Massachusetts, New York, and Pennsylvania—were also located in a common section of the United States and also possessed industrial capabilities geared to energy, defense, and space R&D requirements. The remainder of the top 10 States—Maryland, Texas, Florida, Virginia, and Missouri—likewise attracted industry contracts on the part of the defense or space agencies. Industrial performance in many of these States coincides with the presence of a Federal R&D facility, the activities of which tend to support, attract, or complement industrial R&D efforts. The States in which this relationship is most evident are California, Massachusetts, Maryland, Texas, Florida, and Virginia.

FEDERAL INTRAMURAL

Federal intramural performance accounted for 28 percent of all Federal R&D obligations in 1975. All States received support for intramural performance, but nearly four-fifths of the intramural total was found in the 10 leading States. The States that have numbered among the first 10 States in Federal obligations for intramural performance have remained largely the same throughout the 1965-75 period. These States are found to be widely separated geographically.

The South Atlantic region, including Maryland, the District of Columbia, Virginia, and Florida, has represented the largest share of the Federal intramural total throughout the 1965-75 period. Maryland, the District of Columbia, and Virginia benefit from close proximity to Federal agency headquarters. In Florida, Cape Canavaral and the Eastern Test Range are two important R&D facilities for the conduct of space activities by NASA and missile testing by DOD. California, the second State after Maryland for Federal intramural performance, is in first place in the use of all other sectors and is a prime illustration of the reciprocal effects of intersectoral activities. New Mexico on the other hand, offers open, unpopulated, physical sites advantageous to missile testing, and here are located the Army White Sands Missile Range and the Naval Ordnance Missile Test Facility. Massachusetts, highly populated, offers a level of skills and institutions useful to many R&D activities of DOD. The three other leading States in intramural performance in 1975 were Ohio, Alabama, and Texas.

UNIVERSITIES AND COLLEGES

As a share of total Federal R&D obligations, performance by universities and colleges

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Massachusetts, Maryland, Texas, Florida, and Virginia.

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UNIVERSITIES AND COLLEGES

As a share of total Federal R&D obligations, performance by universities and colleges accounted for 13 percent in 1975. Ten leading States were responsible for 61 percent of all R&D performance by universities and colleges, indicating a wider dispersion of funds than was shown for the industrial and Federal intramural sectors. Six of the 10 leading States for university and college performance were among the top 10 States in total R&D support in 1975, however, indicating that leading States tend to be strong in several sectors. In all of the leading "university and college" States except Massachusetts, HEW was the primary source of support followed by NSF. DOD was the second source after HEW in Massachusetts and NSF the third. Much of the leadership of HEW in all States is derived from support to medical schools.

UNIVERSITY-ADMINISTERED FFRDC's

In 1975, 17 States received Federal R&D support for university-administered FFRDC's. The 10 leading States accounted for 96 percent of the Federal R&D total for this sector. As a share of the Federal R&D total, however, university-administered FFRDC's accounted for only 5 percent. The five leading States were California, New Mexico, Illinois, New York, and Maryland, of which the top four represented sponsorship chiefly on the part of ERDA, which leads all agencies in the use of this sector. Performance in the remaining States was funded chiefly by ERDA, DOD, and NSF.

OTHER NONPROFIT INSTITUTIONS

Other nonprofit institutions (including FFRDC's) accounted for 4 percent of the Federal R&D obligation total in 1975. Even though all States received some support for nonprofit performance, the 10 leading States, including the District of Columbia, represented 82 percent of the total for this sector. R&D work for nonprofit institutions in the five leading States—California, Massachusetts, New York, Pennsylvania, and Washington—was sponsored chiefly by DOD, HEW, and ERDA.

R&D Plant

- Among the 10 leading States to receive R&D plant support, seven were among the top 10 in Federal R&D obligations.
- Nineteen States have been among the 10 leading States at some time during the 1965-75 period. Five States—California, New York, Florida, Maryland, and New Mexico—have always been included in this number.
- For the fifth consecutive year, in 1975 California has ranked first in support for Federal R&D plant. The largest support agencies were DOD, ERDA, and NASA, in that order. In 1975 Washington ranked second for the second consecutive year, and received the largest dollar increase for R&D plant among all States, with most of the increase contributed by ERDA.
- Florida shows the second largest increase for R&D plant support among all the States, as a result of NASA activities related to the space shuttle program. Virginia was among the 10 leading States for the first time since 1968 because of increased NASA and DOD support.
- In 1975 ERDA was the primary source of R&D plant support in six of the 10 leading States: Washington, New Mexico, Pennsylvania, Tennessee, New York, and Illinois. DOD and NASA each was the primary support agency in two of the 10 leading States.

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Federal obligations for R&D plant in the 10 States leading in such support, by agency: FY 1975

[Dollars in millions]

State	Total	ERDA	DOD	NASA	HEW	NSF	DOT	Commerce
Total	$801	$393	$167	$143	$39	$23	$13	$10
California	151	49	54	26	7	2	4	7
Washington	146	146	(2)	–	–	(2)	–	–
Florida	96	–	25	71	–	(2)	–	(2)
New Mexico	68	50	5	1	–	12	–	–
New York	46	29	1	–	15	(2)	–	1
Maryland	40	(2)	24	5	8	(2)	1	1
Tennessee	39	38	1	–	–	–	–	–
Illinois	30	22	7	–	(2)	–	–	–
Virginia	23	–	10	12	–	–	1	–
Pennsylvania	19	16	1	–	–	–	(2)	–
All other States[3]	143	42	39	28	8	9	6	(2)

[1] Includes the Departments of Agriculture and the Interior and the Environmental Protection Agency.

[2] Less than $500,000.

[3] Includes outlying areas and offices abroad.

Source: National Science Foundation

- Florida shows the second largest increase for R&D plant support among all the States, as a result of NASA activities related to the space shuttle program. Virginia was among the 10 leading States for the first time since 1968 because of increased NASA and DOD support.
- In 1975 ERDA was the primary source of R&D plant support in six of the 10 leading States: Washington, New Mexico, Pennsylvania, Tennessee, New York, and Illinois. DOD and NASA each was the primary support agency in two of the 10 leading States.

Factors in R&D Performing Strength

R&D obligations can be ranked by State and compared with such measures of national resources as population, total personal income, total Federal taxes, and doctoral scientists and engineers. Although no direct cause-and-effect relationship can be inferred, the data tend to indicate that the more populous and more wealth-producing areas are in a position to carry out higher levels of R&D performance.

bligations for R&D plant in the 10 States leading in such support, by agency: FY 1975

[Dollars in millions]

	Total	ERDA	DOD	NASA	HEW	NSF	DOT	Commerce	Other[1]
	$801	$393	$167	$143	$39	$23	$13	$10	$14
	151	49	54	26	7	2	4	7	2
	146	146	(2)	–	–	(2)	–	–	(2)
	96	–	25	71	–	(2)	–	(2)	(2)
	68	50	5	1	–	12	–	–	–
	46	29	1	–	15	(2)	–	1	(2)
	40	(2)	24	5	8	(2)	1	1	1
	39	38	1	–	–	–	–	–	(2)
	30	22	7	–	(2)	–	–	–	(2)
	23	–	10	12	–	–	1	–	–
	19	16	1	–	–	–	(2)	–	2
	143	42	39	28	8	9	6	(2)	9

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State	Total Federal R&D obligations		Population		Total personal income		Total Federal taxes[2]		Doctoral scientists and engineers	
	Rank	Percent of total	Rank	Percent of total	Rank	Percent of total	Rank	Percent of total	Rank	Percent of total
United States, total . . .	$18,549 million		[1]213 million		$1,243,313 million		$253,916 million		278 thousand	
California	1	26.09	1	9.94	1	11.17	2	9.36	1	11.48
Maryland	2	8.68	18	1.92	13	2.12	9	2.68	11	3.19
Massachusetts	3	6.63	10	2.73	10	2.89	11	2.57	6	4.36
New York	4	5.71	2	8.50	2	9.62	1	13.88	2	10.12
Florida	5	4.30	8	3.92	9	3.71	12	2.54	13	2.26
Pennsylvania	6	4.18	4	5.55	4	5.59	4	6.12	3	5.51
Virginia	7	3.91	13	2.33	12	2.27	18	1.66	12	2.68
Texas	8	3.85	3	5.74	5	5.30	6	5.55	5	4.48
Washington	9	3.74	22	1.66	19	1.77	21	1.43	20	1.71
Ohio	10	3.16	6	5.05	6	5.09	5	5.96	7	4.25
District of Columbia . .	11	3.13	44	.34	37	.45	(3)	(3)	10	3.47
New Mexico	12	2.99	37	.54	40	.41	44	.22	26	1.11
New Jersey	13	2.38	9	3.43	8	3.90	8	3.74	8	4.20
Illinois	14	2.00	5	5.23	3	6.05	3	7.63	4	4.67
Alabama	15	1.96	21	1.70	24	1.32	27	.87	29	1.02
Missouri	16	1.77	15	2.23	16	2.06	10	2.64	22	1.64
Tennessee	17	1.70	17	1.97	21	1.61	24	1.13	21	1.69
Connecticut	18	1.46	24	1.45	20	1.71	15	2.05	18	1.82
Colorado	19	1.44	28	1.19	26	1.19	19	1.65	17	1.84
Michigan	20	1.34	7	4.30	7	4.60	7	4.99	9	3.48
Nevada	21	.81	47	.28	46	.31	43	.22	50	.16
Minnesota	22	.66	19	1.84	18	1.82	14	2.15	19	1.73
North Carolina	23	.63	11	2.56	14	2.10	16	2.05	14	2.10
Arizona	24	.62	32	1.04	31	.95	32	.54	27	1.05
Louisiana	25	.55	20	1.78	22	1.44	25	1.09	24	1.16
Indiana	26	.50	12	2.49	11	2.39	13	2.34	15	2.09
Georgia	27	.44	14	2.31	17	1.97	20	1.55	23	1.63
Utah	28	.43	36	.57	36	.47	39	.31	32	.92
Wisconsin	29	.43	16	2.16	15	2.08	17	1.82	16	1.88
Oregon	30	.42	30	1.07	29	1.03	28	.85	28	1.03
Rhode Island	31	.40	39	.43	38	.44	34	.41	39	.47
Idaho	32	.36	41	.38	43	.33	40	.30	42	.39
Mississippi	33	.31	29	1.10	33	.76	37	.37	36	.57
Iowa	34	.26	25	1.35	23	1.36	26	.96	30	.96
West Virginia	35	.25	34	.85	35	.70	35	.40	38	.49
Hawaii	36	.23	40	.41	39	.44	38	.36	41	.40
Kentucky	37	.19	23	1.59	25	1.27	22	1.35	33	.89
Alaska	38	.19	51	.17	49	.25	46	.18	51	.15
Oklahoma	39	.18	27	1.27	27	1.09	23	1.17	31	.93
New Hampshire	40	.18	42	.38	42	.34	42	.23	44	.35
Kansas	41	.18	31	1.06	28	1.09	29	.85	34	.85
Vermont	42	.17	49	.22	50	.19	50	.10	46	.32
Montana	43	.14	43	.35	44	.33	47	.16	45	.35
South Carolina	44	.13	26	1.32	30	1.02	31	.59	35	.78
Arkansas	45	.13	33	.99	34	.75	36	.39	40	.41
Nebraska	46	.11	35	.73	32	.77	30	.73	37	.55
Wyoming	47	.09	50	.18	51	.18	49	.11	48	.20
North Dakota	48	.07	46	.30	47	.30	45	.19	47	.23
Maine	49	.06	38	.50	41	.41	41	.24	43	.37
Delaware	50	.05	48	.27	45	.32	33	.51	25	1.16
South Dakota	51	.03	45	.32	48	.27	48	.16	49	.19
Outlying areas and offices abroad	—	.39	—	—	—	—	—	[4].48	—	.27

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[1] Provisional estimates of resident population as of July 1, 1975.

[2] Includes individual income and employment taxes, corporate income, excise, estate and gift taxes (minus refunds).

[3] Included in Maryland tax figures.

[4] Collections from and refunds to U.S. taxpayers in Puerto Rico, Canal Zone, and in foreign countries.

Sources: U.S. Department of Commerce, Bureau of the Census, *Current Population Reports*, Series P-25, No. 615, November 1975 and Bureau of Economic Analysis, *Survey of Current Business*, Volume 56, No. 4, April 1976; U. S. Department of the Treasury, *Statistical Appendix to Annual Report of the Secretary of the Treasury on the State of the Finances for the Fiscal Year Ended June 30, 1975;* National Science Foundation.

Impact of Subcontracting

As previously noted, data on geographic distribution in this report are based on the location of prime contractors performing R&D work. Therefore, they do not reflect the redistribution of Federal R&D funds among the States as a result of subcontracting. Data on NASA prime contract and subcontract awards for 1975 are provided to give some indication of the impact of subcontracting.

The NASA data cover first-tier subcontracts in excess of $10,000 on each of their prime contracts in excess of $500,000. They also cover second-tier subcontracts in excess of $10,000 on each first-tier subcontract in excess of $50,000.

The NASA data indicate that significant redistribution of R&D funds among States would be disclosed by availability of full subcontracting data from all agencies. In 1975 the support to most States increased as a result of subcontract awards, California representing a notable exception. A number of smaller NASA support States showed substantial net increases in relation to prime contracts.

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NASA SYNOPSIS

- NASA prime contracts totaled $2,299 million in 1975, and subcontracts amounted to $590 million. Of this total $290 million, or 49 percent, remained within the prime contract States. The remaining $300 million, or 51 percent, was awarded to other States. (See table.)
- Prime contractors in 20 States let contracts to subcontractors in 44 States and the District of Columbia.
- As a result of subcontracting, 41 States, including the District of Columbia, showed an increase in their share of procurements, four States showed a decrease, and five States remained unchanged.
- Only one of the four States showing a decrease was among the five leading States in 1975 prime contract awards.

U. S. geographical distribution of NASA prime contract and subcontract awards: FY 1975

[Dollars in thousands]

States	Prime contract awards to States		Subcontract awards			Net total-prime contract and subcontract awards	
	Amount	Percent of total	Received from other States	Awarded to other States	Net total[2]	Amount[3]	Percent of total
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Total	$2,299,209	100.0	$300,275	$300,275	–	$2,299,209	100.0
Alabama	77,018	3.3	1,380	49	1,331	78,349	3.4
Alaska	1,387	.1	101	–	101	1,488	.1
Arizona	10,315	.4	22,139	1,313	20,826	31,141	1.4
Arkansas	189	(1)	–	–	–	189	(1)
California	1,081,905	47.1	13,820	239,058	(225,238)	856,667	37.3
Colorado	101,490	4.4	12,140	1,198	10,942	112,432	4.9
Connecticut	31,593	1.4	19,357	3,790	15,567	47,160	2.1
Delaware	548	(1)	115	–	115	663	(1)
District of Columbia	15,135	.7	705	25	680	15,815	.7
Florida	169,782	7.4	33,273	844	32,429	202,211	8.8
Georgia	4,615	.2	7,303	–	7,303	11,918	.5
Hawaii	2,303	.1	12	–	12	2,315	.1
Idaho	–	–	27	–	27	27	(1)
Illinois	7,156	.3	15,149	–	15,149	22,305	1.0
Indiana	4,759	.2	1,030	–	1,030	5,789	.3
Iowa	2,923	.1	376	–	376	3,299	.1
Kansas	2,132	.1	145	–	145	2,277	.1
Kentucky	687	(1)	31	–	31	718	(1)
Louisiana	57,098	2.5	13	15,515	(15,502)	41,596	1.8
Maine	1	(1)	–	–	–	1	(1)
Maryland	171,249	7.4	2,530	2,347	183	171,432	7.5
Massachusetts	45,451	2.0	9,011	1,199	7,812	53,263	2.3
Michigan	7,089	.3	2,201	–	2,201	9,290	.4
Minnesota	11,929	.5	4,775	87	4,688	16,617	.7
Mississippi	16,120	.7	225	340	(115)	16,005	.7
Missouri	3,169	.1	13,482	24	13,458	16,627	.7
Montana	20	(1)	–	–	–	20	(1)
Nebraska	309	(1)	457	–	457	766	(1)
Nevada	547	(1)	12	–	12	559	(1)
New Hampshire	692	(1)	707	–	707	1,399	.1
New Jersey	37,223	1.6	17,995	15,629	2,366	39,589	1.7
New Mexico	8,565	.4	37	24	13	8,578	.4
New York	53,759	2.3	76,312	4,163	72,149	125,908	5.5
North Carolina	2,075	.1	342	–	342	2,417	.1
Ohio	40,317	1.8	6,405	1,983	4,422	44,739	1.9
Oklahoma	1,145	(1)	196	134	62	1,207	.1
Oregon	1,483	.1	140	–	140	1,623	.1
Pennsylvania	35,485	1.5	5,732	2,426	3,306	38,791	1.7
Rhode Island	521	(1)	25	–	25	546	(1)
South Carolina	442	(1)	21	–	21	463	(1)
South Dakota	243	(1)	–	–	–	243	(1)
Tennessee	2,862	.1	3,358	–	3,358	6,220	.3
Texas	203,549	8.9	10,593	2,698	7,895	211,444	9.2
Utah	18,513	.8	369	6,598	(6,229)	12,284	.5
Vermont	22	(1)	1,111	–	1,111	1,133	(1)
Virginia	52,208	2.3	851	503	348	52,556	2.3
Washington	9,440	.4	13,177	328	12,849	22,289	1.0
West Virginia	600	(1)	170	–	170	770	(1)
Wisconsin	2,041	.1	2,925	–	2,925	4,966	.2
Wyoming	1,105	(1)	–	–	–	1,105	(1)

[1] Less than .05 percent.

[2] Parentheses indicate that the awards to other States exceed the awards from other States.

[3] Column (b) plus or minus column (f).

NOTE: Prime contract awards exclude smaller procuments, generally those of less than $10,000; also exclude awards placed through other Government agencies, awards outside the United States, and actions on JPL contracts. Subcontract awards include those of $10,000 and over on prime contracts of $500,000 and over.

Source: National Aeronautics and Space Administration, Office of Procurement, *Annual Procurement Report, Fiscal Year 1975.* Washington, D.C. 20546.

Part II

FEDERAL FUNDS FOR SCIENTIFIC AND TECHNICAL INFORMATION

Scientific and technical information (STI) is defined as knowledge or data resulting from the conduct of research and development, or required for organizing, administering, or performing research and development. Such information is used largely by scientists and engineers engaged in R&D work.

STI activities cover a broad range, including publication and distribution; documentation, reference and information services; symposia and audiovisual communication; and R&D work in the information sciences. This last category directly overlaps the R&D activities reported in part I of this survey.

The data on STI in *Federal Funds* surveys include only direct STI obligations of Federal agencies; STI costs under R&D contracts and grants are specifically excluded. It follows, therefore, that the totals in this report only partly reflect the STI activities supported by the Federal Government.

Despite this limitation, the broad measurement of direct STI costs on a functional basis can be useful as a guide to analysis and planning.

AGENCIES AND ACTIVITIES

- STI activities are currently growing. An estimated increase of 8 percent in the total in 1976 was expected to be followed by an estimated increase of 4 percent in 1977.
- At present the Department of Commerce accounts for approximately one-fourth of all STI activities, the Department of Defense (DOD) for just over one-fifth,[10] and the Department of Health, Education, and Welfare (HEW), for just under one-fifth.

Federal obligations for scientific and technical information, by agency

[Dollars in millions]

Agency	Actual	Estimates			
	1975	1976	Percent change 1975-76	1977	Percent change 1976-77
Total	$398.1	$430.3	+ 8.1	$445.6	+ 3.5
Department of Commerce	95.9	107.8	+12.4	109.9	+ 1.9
Department of Defense	86.7	95.5	+10.1	94.9	- 0.7
Department of Health, Education, and Welfare	79.5	78.3	- 1.5	84.5	+ 7.9
Library of Congress	31.2	32.8	+ 5.8	36.9	+12.5
Department of the Interior	24.8	30.5	+23.0	30.3	+ 0.5
National Aeronautics and Space Administration	24.3	25.3	+ 4.1	26.9	+ 6.2
Department of Agriculture	14.4	16.5	+14.7	17.0	+ 2.7
Other agencies	41.3	43.6	+ 5.6	45.2	+ 3.7

Source: National Science Foundation

Trends

- Between 1960 and 1977 federally funded STI activities have increased almost six times.
- In 1977 obligations for STI activities are the equivalent of an estimated 1.9 percent of all Federal R&D obligations. The comparable ratio in 1960 was 1.0 percent.

Trends in Federal obligations for scientific and technical information activities, by major categories

[Dollars in millions]

Fiscal year	Total	Publication and distribution	Documentation, reference, and information services	Symposia and audiovisual media	R&D in information sciences, documentation and information systems, techniques and devices
1960	$ 75.9	$ 37.0	$ 28.4	$ 7.6	$ 2.9
1961	91.6	48.7	29.0	6.7	7.2
1962	128.5	55.7	42.4	17.0	13.3
1963	164.5	67.7	64.0	21.0	11.9
1964	[1]203.2	59.9	90.8	22.7	12.6
1965	224.7	68.2	102.0	32.0	22.5
1966	277.7	82.7	124.6	22.5	48.0
1967	324.4	87.1	152.5	31.7	53.1
1968	359.2	100.7	165.6	34.1	58.8
1969	362.5	96.0	170.9	31.8	63.7
1970	386.8	98.9	198.1	32.6	62.1
1971	397.6	106.0	193.8	32.8	65.0
1972	419.4	116.6	196.5	36.5	69.7
1973	427.1	120.9	194.8	34.1	77.3
1974	442.8	129.1	199.4	35.0	79.3
1975	398.1	123.3	179.2	23.8	71.8
1976 (est.)	430.3	137.9	192.0	25.5	74.9
1977 (est.)	445.6	140.5	202.1	26.8	76.2

[1] Includes $17.2 million for management, which was reported separately from the other categories in 1964 only.

NOTE: Overall totals for 1975-77 and totals for documentation, reference, and information services are preliminary and subject to revision as a result of incomplete reporting for those years by the Department of the Army. Other category totals may also be revised slightly.

Source: National Science Foundation

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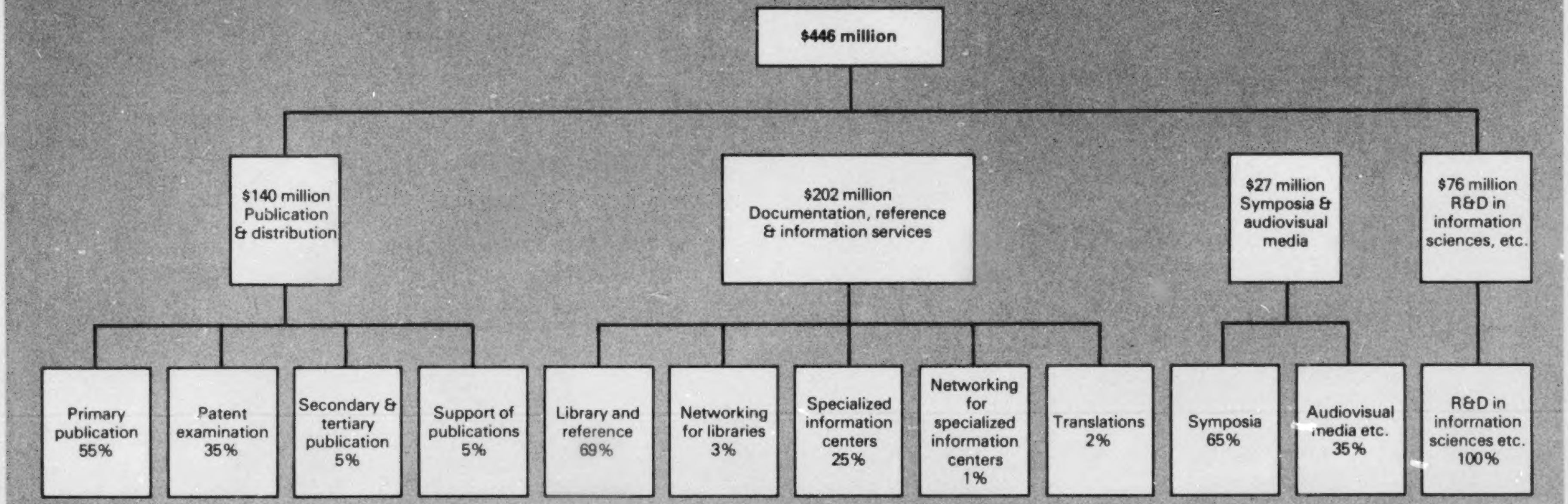
[10] In the current (1975-77) reporting period the DOD total and the Federal overall total have been reduced significantly from former levels because of incomplete reporting by the Department of the Army. Some revision of these totals is expected, and therefore they must be considered preliminary.

- The greatest dollar growth in a category of STI activities is found in documentation, reference, and information services, which will represent an estimated 45 percent of all STI activities in 1977. The strong growth in this category reflects the proliferation of library and specialized information center services, including high costs of modern retrieval systems. A specific subcategory for networking was included in the current survey for the first time.
- At present publication and distribution, including patent examination, makes up the next most important STI category. This area is expected to represent 32 percent of the STI total in 1977.
- Research and development in information sciences has shown the greatest relative increase between 1960 and 1977, having grown 26 times in that period. The share of this category in the STI total is an estimated 17 percent in 1977.
- Symposia and audiovisual media is expected to account for 6 percent of all STI activities in 1977.

Categories

- Major categories have been further subdivided in the present survey in order to make visible more kinds of STI activity.
- Within publication and distribution, for example, primary publication is found to represent an estimated 55 percent of the total, with secondary and tertiary publication only 5 percent. Patent examination has been separately identified for the first time and represents 35 percent of the total.
- Under documentation, reference, and information services, the library and reference subcategory is still in the lead with 69 percent of the STI total, followed by specialized information center services with 25 percent. Networking for both of these still represents very small shares of the total but can be expected to grow.
- Symposia and technical meetings make up almost two-thirds of the symposia and audiovisual media category and audiovisual media activities make up about one-third.

Federal obligations for scientific and technical information by activity: FY 1977 (est.)


$446 million
$140 million Publication & distribution
$202 million Documentation, reference & information services
$27 million Symposia & audiovisual media
$76 million R&D in information sciences, etc.
Primary publication 55%
Patent examination 35%
Secondary & tertiary publication 5%
Support of publications 5%
Library and reference 69%
Networking for libraries 3%
Specialized information centers 25%
Networking for specialized information centers 1%
Translations 2%
Symposia 65%
Audiovisual media etc. 35%
R&D in information sciences etc. 100%

SOURCE: National Science Foundation

Agencies

- Of the 24 agencies reporting obligations for STI activities in 1977, seven account for 90 percent of the STI total.
- STI costs are not wholly comparable among agencies; some agencies have full reporting systems while others lack the means to identify relevant STI costs. In the 1975-77 period, 12 Federal agencies reported R&D programs but did not report any STI activities, although some of their programs may have included such activities. Some STI programs are included within extramural R&D contracts and grants and, thus, are not reported.
- Only in some cases do STI efforts bear a direct relationship to an agency's R&D work. STI efforts can represent services that are independent of agency R&D programs, such as the Patent and Trademark Office within Commerce, the National Agricultural Library within USDA, and the STI activities of the Library of Congress.
- Commerce, DOD, and HEW combined will account for an estimated 66 percent of the STI total in 1977.
- Commerce is currently the leading agency in STI support, mainly because of the work of the Patent and Trademark Office, which was the largest agency subdivision to report STI activities.
- DOD is the next agency in size of support. Within DOD the Defense Agencies—including the Defense Advanced Research Projects Agency (DARPA), the Defense Nuclear Agency, the Defense Supply Agency, and the Defense Communications Agency—report the largest obligations, mostly because of funding for R&D projects of DARPA and funding for the Defense Documentation Center within Defense Supply. Otherwise the three services—Navy, Air Force, and Army—support all categories of STI activity although Army reporting of such activities is considerably diminished.[11]
- HEW is expected to make up 19 percent of all STI obligations in 1977 with more than 8 out of 10 dollars provided by the National Institutes of Health, including the National Library of Medicine.
- The National Library of Congress reports a large share of its activities as in support of R&D goals, much related to the social sciences.
- Within Interior a considerable effort of the Geological Survey is regarded as constituting STI activities.
- NASA and ERDA are agencies that report small amounts of STI obligations in relation to the size of their R&D programs because so much of their R&D work is performed extramurally and STI activities are not identified.

Distribution of Federal obligations for scientific and technical information activities, by agency and subdivision: FY 1977 (est.)

[Dollars in millions]

Agency and subdivision	Total obligations	Percent
Total, all agencies	$445.6	100.0
Department of Commerce	109.9	24.7
Patent and Trademark Office	81.8	18.4
National Technical Information Service	12.9	2.9
National Bureau of Standards	8.7	1.9
National Oceanic and Atmospheric Administration	5.7	1.3
Other	.8	.2
Department of Defense	94.9	21.3
Defense Agencies	55.9	12.5
Department of the Navy	20.3	4.5
Department of the Air Force	13.2	3.0
Department of the Army	5.6	1.2
Department of Health, Education, and Welfare	84.5	19.0
National Institutes of Health	71.9	16.1
(National Library of Medicine)	(34.5)	(7.7)
Alcohol, Drug Abuse, and Mental Health Administration	4.4	1.0
Food and Drug Administration	4.4	1.0
Center for Disease Control	2.5	.6
Other	1.3	.3
Library of Congress	36.9	8.3
Department of the Interior	30.3	6.8
Geological Survey	23.8	5.4
Natural Resources Library	2.3	.5
Other	4.2	.9
National Aeronautics and Space Administration	26.9	6.0
Department of Agriculture	17.0	3.8
National Agricultural Library	6.0	1.4
Forest Service	5.1	1.1
Agriculture Research Service	4.5	1.0
Other	1.4	.3
Energy Research and Development Administration	8.2	1.8
National Science Foundation	7.7	1.7
Veterans Administration	6.8	1.5
Smithsonian Institution	6.2	1.4
Department of Transportation	4.8	1.1
Environmental Protection Agency	3.1	.7
Other agencies	8.6	1.9

Source: National Science Foundation

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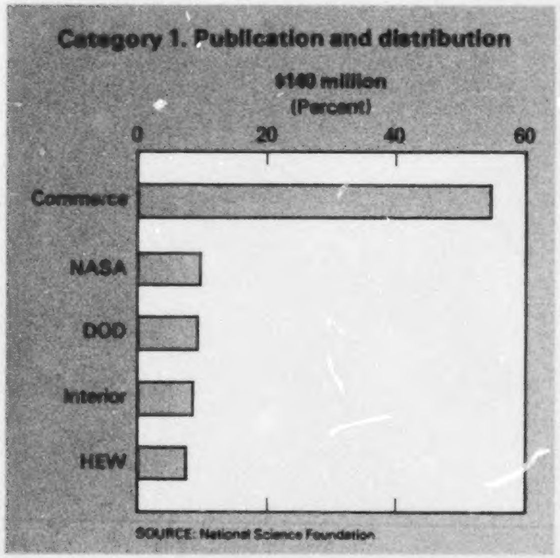
[11] See footnote 10, p. 47.

Activities

- Certain agencies tend to account for most of the work in certain categories of activity. Commerce is, for example, predominant in publication and distribution because of patent work; DOD and HEW are predominant in symposia and audiovisual media, and DOD in R&D in information sciences. HEW, the Library of Congress, Commerce, and DOD lead in documentation, reference, and information services. STI functions tend to flow back and forth between categories, and the larger the R&D programs of an agency, the more STI categories of activity are likely to be important.


Category 1. Publication and distribution

$140 million
(Percent)

SOURCE: National Science Foundation

Commerce: Patent and Trademark Office
76,500 patents in FY 1977 (est.)
Official Gazette, weekly abstracts of current patents
National Technical Information Service
Weekly Government Abstracts

DOD: Departments of the Army, Navy, and Air Force
Journal articles
Technical reports
Technical notes
Technical memorandums
Contractors' and grantees' reports
Research reviews
Research bulletins
Research reports
Newsletters
Surveys
Monographs
Proceedings of symposia
Handbooks
Books
Abstracts and bibliographies

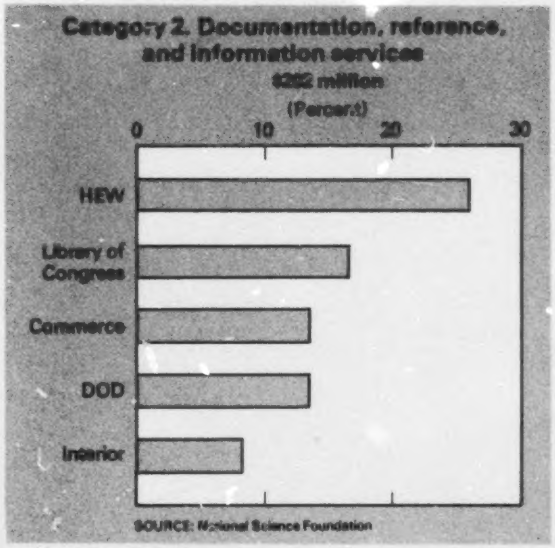
NASA
Journal articles
Technical reports, notes, and memorandums
Contractors' reports
Conference proceedings
Scientific and Technical Abstracts (STAR)
International Aerospace Abstracts
Indexes
Bibliographies
Technical reprints
Special publications

Interior: Geological Survey
Books
Maps
Charts
Atlases
Research summaries
Journal articles
Bibliography of North American Geology
Geophysical Abstracts

HEW: National Institutes of Health
Journals of the institutes
Journal articles
Indexes
Bibliographies
Abstracts
Monographs
Books
Reports
Alcohol, Drug Abuse, and Mental Health Administration
Scientific and technical papers
Manuals
Reviews and analyses
Journal articles

USDA
Papers
Bulletins
Reports
Periodicals

ERDA
Technical reports
Progress reports
Summary reports
Topical reports
Journal articles
Proceedings of meetings
Progress reviews
Books
Monographs
Bibliographies


Category 2. Documentation, reference, and information services

$262 million
(Percent)

SOURCE: National Science Foundation

DOD: Defense Agencies
Defense Documentation Center
Departments of the Army, Navy, and Air Force
Libraries
Specialized information centers
Technical information analysis centers
Translations

HEW: National Institutes of Health
- National Library of Medicine
- Specialized information centers
- Translations
- **Food and Drug Administration**
- Specialized information centers
- **Alcohol, Drug Abuse, and Mental Health Administration**
- Specialized information centers

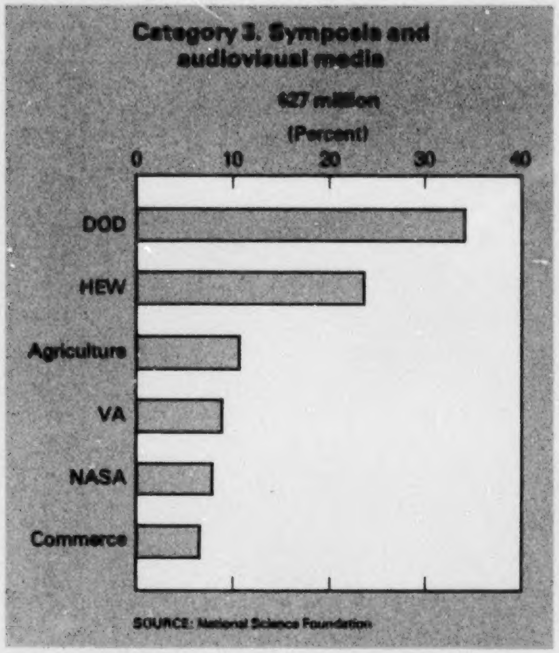
Library of Congress
- Science and technology portion

Commerce: Patent and Trademark Office
- Search Room
- **National Technical Information Service (NTIS)**
- **National Bureau of Standards**
- National Standard Reference Data System (NSRDS)

Interior: Geological Survey
- Geological Survey Library
- **Natural Resources Library**

NASA
- S&TI documentation facility
- Headquarters and field center libraries
- Specialized information centers
- Regional dissemination centers
- Translations

USDA
- **National Agricultural Library**



Category 3. Symposia and audiovisual media

$27 million

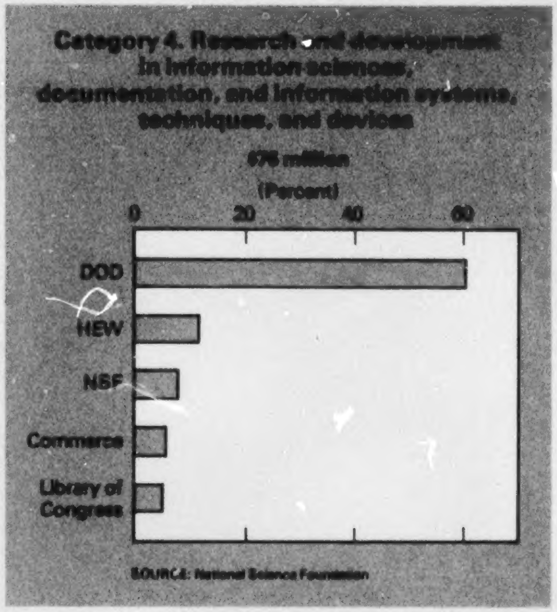
SOURCE: National Science Foundation

DOD: Departments of the Army, Navy, and Air Force
- Science conferences
- Support of symposia with professional groups, scientific societies, and educational institutions
- Motion pictures
- Slides
- Video tapes
- Exhibits

HEW: National Institutes of Health
- Travel to scientific meetings, U.S. and abroad
- Support to conferences and symposia
- Support of international congresses
- Sound films on physical functions, diseases, and treatment
- TV interviews
- Slides
- Photographs
- Exhibits

NASA
- Participation in and support of scientific symposia and technical meetings

VA
- Participation in seminars and symposia
- Films
- Slides



Category 4. Research and development in information sciences, documentation, and information systems, techniques, and devices

$76 million

SOURCE: National Science Foundation

DOD: Defense Agencies (largely DARPA)
- **Departments of the Army, Navy, and Air Force**
- R&D in advanced information systems
- Development of engineering data systems
- Support of development of discipline-based information systems
- Studies of man-computer relationships (Project MAC)
- Basic research in information sciences

HEW: National Institutes of Health (including NLM)
- Improvement of Medlars system of NLM
- Development of mechanized searching services in the institutes
- Development of computer time-sharing techniques
- **Alcohol, Drug Abuse, and Mental Health Administration**
- Improvement of information systems

NSF
- Research in storage and retrieval strategies
- Development of access improvement systems and user-oriented science information services

Commerce: National Bureau of Standards
- R&D activities of the Institute for Computer Science and Technology and NSRDS

Library of Congress
- Development of MARC cataloging system

APPENDIXES

A. Technical Notes

B. Federally Funded Research and Development Centers

C. Statistical Tables, Part I

D. Statistical Tables, Part II

Note

The detailed statistical tables for this volume for parts I and II, appendixes C and D, have been published separately under one cover.

Included on pp. 66-70 in this volume are appendix C summary tables 1, 2, and 3, as well as a complete listing of all the tables in appendixes C and D. **Detailed statistical tables may be obtained gratis from the National Science Foundation, Washington, D.C. 20550.**

APPENDIX A

Technical Notes

SCOPE AND METHOD

This report is organized in two parts. Part I is concerned with Federal funds for research, development, and R&D plant, and part II reports on funds for activities associated with the collection and dissemination of scientific and technical information.

Between March and May of 1976 a total of 35 Federal agencies and their subdivisions—93 individual respondents—submitted data in response to a survey questionnaire developed by the Foundation and distributed in January 1976. With the exception of NASA, the data received from the agencies were in terms of obligations and outlays incurred, or expected to be incurred, regardless of when the funds were appropriated or whether they were identified in the respondent's budget specifically for R&D activities. NASA reported its 1975, 1976, and 1977 obligational transactions in terms of the budget plan, which approximates obligations.

Federal agencies earlier provided R&D data to the Office of Management and Budget for inclusion in "Special Analysis P: Federal Research and Development Programs" in *The Budget of the United States Government, Fiscal Year 1977*. Although the R&D data in the two reports are reconcilable (see Relation to Other Reports, p. 59), the data in the *Federal Funds* report are more comprehensive and are tabulated in greater detail. Furthermore, the *Federal Funds* report incorporates revisions that have resulted from changes made in the R&D portion of the budget subsequent to the budget message of the President to Congress in January 1976.

DEFINITIONS

Definitions are presented for the two parts of the report. Some definitions in part I are also applicable to part II. The definitions are essentially unchanged from prior issues of the *Federal Funds* series.

Part I. Research, Development, and R&D Plant

(1) RESEARCH, DEVELOPMENT, AND R&D PLANT

This term includes all direct, indirect, incidental, or related costs resulting from or necessary to research, development, and R&D plant, regardless of whether the research and development are performed by a Federal agency (intramural) or performed by private individuals and organizations under grant or contract (extramural). Research and development exclude routine product testing, quality control, mapping and surveys, collection of general-purpose statistics, experimental production, and activities concerned primarily with the dissemination of scientific information and the training of scientific manpower.

a. **Research** is systematic, intensive study directed toward fuller scientific knowledge or understanding of the subject studied. Research is classified as either basic or applied.

In **basic research** the investigator is concerned primarily with gaining a fuller knowledge or understanding of the subject under study.

In **applied research** the investigator is primarily interested in a practical use of the knowledge or understanding for the purpose of meeting a recognized need.

b. Development is systematic use of the knowledge and understanding gained from research, directed toward the production of useful materials, devices, systems, or methods, including design and development of prototypes and processes. It excludes quality control, routine product testing, and production.

c. **R&D plant** (R&D facilities and fixed equipment, such as reactors, wind tunnels, and radio telescopes) includes acquisition of, construction of, major repairs to, or alterations in structure, works, equipment, facilities, or land, for use in R&D activities at Federal or non-Federal installations. Excluded from the R&D plant category are expendable equipment and office furniture and equipment. Obligations for foreign R&D plant are limited to Federal funds for facilities located abroad and used in support of foreign research and development.

(2) OBLIGATIONS AND OUTLAYS

a. **Obligations** represent the amounts for orders placed, contracts awarded, services received, and similar transactions during a given period, regardless of when the funds were appropriated and when future payment of money is required.

b. **Outlays** represent the amounts for checks issued and cash payments made during a given period, regardless of when the funds were appropriated.

The obligations and outlays reported cover all transactions from all funds available to the agency from direct appropriations, trust funds or special account receipts, corporate income, or other sources, including funds appropriated by the President, that the agency received or expects to receive. The amounts reported for each year reflect obligations and outlays for that year regardless of when the funds were originally authorized or received and regardless of whether they were appropriated, received, or identified in the agency's budget specifically for research, development, or R&D plant.

An agency making a transfer of funds to another agency includes such transfers in its report of obligations and outlays. The receiving agency does not report, for purposes of

113

114

this survey, funds transferred to it from another agency. Similarly, a subdivision of an agency that transfers funds to another subdivision within that agency reports such obligations or outlays as its own.

Obligations and outlays for work performed in foreign countries include funds directly available to Federal agencies and special foreign currencies separately appropriated. The latter currencies are derived largely from provisions of Public Law 480, 1954, as amended.

(3) COST COVERAGE

Funds reported for research and development reflect full costs. In addition to costs of specific R&D projects, the applicable overhead costs are also included. The amounts reported include the costs of planning and administering R&D programs, laboratory overhead, pay of military personnel, and departmental administration.

(4) FISCAL YEAR

For the first two years covered by this report, 1975 and 1976, the fiscal year is the Government accounting period beginning July 1 of one year and ending June 30 of the following year; thus, fiscal year 1976 began on July 1, 1975 and ended June 30, 1976. However, beginning in 1977 and applicable to each year thereafter, the Government accounting period begins October 1 of one year and ends September 30 of the following year; thus, fiscal year 1977 began October 1, 1976 and will end September 30, 1977. The months of July-September 1976 made up a transition period, with the data for this period tabulated separately and in broad totals only.

(5) AGENCY

An agency is an organization of the Federal Government whose principal executive officer reports to the President. The only exception (also included in the survey) is the Library of Congress, whose executive officer reports to Congress. The term subdivision refers to any major organizational unit of a reporting agency, such as a bureau, division, office, or service.

(6) PERFORMERS

Performers are either intramural organizations accomplishing operating functions or extramural organizations or persons receiving support or providing services as a result of a contract or grant.

a. **Intramural performers** are the agencies of the Federal Government. Their work is carried on directly by their own personnel. Obligations reported under this category are for activities performed by the reporting agency itself, or they represent funds that the agency transfer to another Federal agency for performance for work. The ultimate performer must be a Federal agency. If the ultimate performer is not a Federal agency, the funds so transferred are reported by the transferring agency under the appropriate extramural performer category (industrial firms, universities, and colleges, other nonprofit institutions). Intramural performance includes the costs of supplies and equipment, essentially of an "off-the-shelf" nature, that are procured for use in intramural research and development. Also included as part of the intramural performance total are the expenses of Federal personnel engaged in planning and administering intramural and extramural R&D programs.

b. **Extramural performers** are all organizations outside the Federal complex that perform with Federal funds under contract or grant. Only costs of actual extramural R&D performance are reported. For example, the purchase from an extramural source of a launch vehicle which is operational, i.e., has gone beyond the development or prototype stage and is used for the performance of research and development, is reported as part of the cost of intramural research and development. Extramural performers are identified as follows:

(i) *Industrial firms* are those organizations that may legally distribute net earnings to individuals or to other organizations.

(ii) *Universities and colleges* are institutions engaged primarily in providing resident instruction for at least a 2-year program above the secondary school level. Included are colleges of liberal arts; schools of arts and sciences; professional schools, such as in engineering and medicine, including affiliated hospitals; associated research institutes; and agricultural experiment stations.

(iii) *Other nonprofit institutions* are private organizations other than educational institutions, no part of whose net earnings inure to the benefit of a private stockholder or individual, and other private organizations organized for the exclusive purpose of turning over their entire net earnings to such nonprofit organizations. Also, private individuals directly awarded R&D grants or contracts are included under nonprofit institutions.

(iv) *Federally Funded Research and Development Centers* are R&D-performing organizations exclusively or substantially financed by the Federal Government that are supported by the Federal Government either to meet a particular R&D objective or, in some instances, to provide major facilities at universities for research and associated training purposes. Each center is administered by one of the above extramural performers.

In general, all of the following qualification criteria are met by an institutional unit before it is included in the Federally Funded Research and Development Center category: (1) Its primary activities include one or more of the following: basic research, applied research, development, or management of research and development (specifically excluded are organizations engaged primarily in routine quality control and testing, routine service activities, production, mapping and surveys, and information dissemination); (2) it is a separate operational unit within the parent organization or is organized as a separately incorporated organization; (3) it performs actual research and development or R&D management either upon direct request of the Federal Government or under a broad charter from the Federal Government, but in either case under the direct monitorship of the Federal Government; (4) it receives its major financial support (70 percent or more) from the Federal Government, usually from one agency; (5) it has or is expected to have a long-term relationship with its sponsoring agency (about 5 years or more), as evidenced by specific obligations assumed by it and the agency; (6) most or all of its facilities are owned or are funded for in the contract with the Federal Government; and (7) it has an average annual budget (operating and capital equipment) of at least $500,000.

(v) *State and local governments* are State and local government agencies, excluding State and local universities and colleges, agricultural experiment stations, medical schools, and affiliated hospitals. Federal R&D funds obligated directly to such State and local education institutions are included under the universities and colleges performing sector in this survey. Research and development under the State and local category are either performed by the State or local agencies themselves or granted or contracted by such agencies for performance by other organizations. Regardless of the ultimate performer, Federal R&D funds directed to State and local governments are reported under the State and local government sector and no other.

(vi) *Foreign performers* are confined to foreign citizens, organizations, or governments, as well as international organizations, such as NATO, UNESCO, WHO, performing work abroad financed by the Federal Government. Excluded are payments to U.S. agencies, organizations, or citizens performing research and development abroad for the Federal Government (the survey objectives do not include information on "offshore" payments). Also excluded are payments to foreign scientists performing in the United States.

(7) FIELDS OF SCIENCE

The fields of science in this survey are divided into eight broad field categories, most of them consisting of a number of detailed fields. The broad fields are life sciences, psychology, physical sciences, environmental sciences, mathematics, engineering, social sciences, and other sciences not elsewhere classified. The following listing presents the fields grouped under each of the broad fields, together with illustrative disciplines.

a. **Life sciences** consist of the biological, clinical medical, other medical sciences, and life sciences not elsewhere classified.

Life sciences include the following disciplines: Anatomy; animal sciences; bacteriology; biochemistry; biogeography; biological oceanography; biophysics; dentistry; ecology; embryology; entomology; evolutionary biology; genetics; immunology; internal medicine; microbiology; neurology; nutrition and metabolism; opthalmology; parasitology; pathology; pharmacology; pharmacy; physical anthropology; physical medicine and rehabilitation; physiology; plant sciences; podiatry; preventive medicine and public health; psychiatry, radiobiology; radiology; surgery; systematics; veterinary medicine.

Research in some of these disciplines may be classed as biological, clinical medical, or other medical, depending upon the nature of the particular project.

Biological sciences are those which, apart from the clinical medical and other medical sciences as defined below, deal with the origin, development, structure, function, and interactions of living things.

Clinical medical sciences are concerned with the study of the pathogenesis, diagnosis, or therapy of a particular disease or abnormal condition in living human subjects under controlled conditions.

Other medical sciences are concerned with studies of the causes, effects, prevention, or control of abnormal conditions in man or in his environment as they relate to health, except for the clinical aspects as defined above.

Life sciences, nec[1]

b. **Psychology** deals with behavior, mental processes, and individual and group characteristics and abilities. Psychology is divided into three categories: biological aspects, social aspects, and psychological sciences not elsewhere classified. Examples of the disciplines under each of these fields are:

Biological aspects:

experimental psychology; animal behavior; clinical psychology; comparative psychology; ethology.

Social aspects:

social psychology; educational, personnel, vocational psychology and testing; industrial and engineering psychology; development and personality.

Psychological sciences, nec[1]

c. **Physical sciences** are concerned with the understanding of the material universe and its phenomena. They comprise the fields of astronomy, chemistry, physics, and physical sciences not elsewhere classified. Examples of the disciplines under each of these fields are:

Astronomy:

laboratory astrophysics; optical astronomy; radio astronomy; theoretical astrophysics; X-ray, Gamma-ray, neutrino astronomy.

Chemistry:

inorganic; organo-metallic; organic; physical

Physics:

acoustics; atomic and molecular; condensed matter; elementary particles; nuclear structure; optics; plasma.

Physical sciences, nec[1]

d. **Environmental sciences** (terrestrial and extraterrestrial) are concerned with the gross nonbiological properties of the areas of the solar system which directly or indirectly affect man's survival and welfare; they comprise the fields of atmospheric sciences, geological sciences, oceanography, and environmental sciences not elsewhere classified. Obligations for oceanography are confined to studies supporting physical oceanography. Studies pertaining to life in the sea, or other bodies of water, are reported as support biology. Support of ship operations is, where appropriate, prorated between physical and biological oceanography. Examples of the disciplines under each of these fields follow.

Atmospheric sciences:

aeronomy; solar; weather modification; extraterrestrial atmospheres; meteorology.

Geological sciences:

engineering geophysics; general geology; geodesy and gravity; geomagnetism; hydrology; inorganic geochemistry; isotopic geochemistry; organic geochemistry; laboratory geophysics; paleomagnetism; paleontology; physical geography and cartography; seismology; soil sciences.

Oceanography:

chemical oceanography; geological oceanography; physical oceanography; marine geophysics.

Environmental sciences, nec[1]

e. **Mathematics** employs logical reasoning with the aid of symbols and is concerned with the development of methods of operation employing such symbols. Examples of mathematical disciplines are algebra; analysis; applied mathematics; computer science; foundations and logic; geometry; numerical analysis; statistics; topology.

f. **Engineering** is concerned with studies directed toward developing engineering principles or toward making specific scientific principles usable in engineering practice. Engineering is divided into eight fields: aeronautical, astronautical, chemical, civil, electrical, mechanical, metallurgy and materials, and engineering not elsewhere classified. The following are examples of disciplines under each of these fields.

Aeronautical:

aerodynamics.

Astronautical:

aerospace; space technology.

Chemical:

petroleum; petroleum refining; process.

Civil:

architectural; hydraulic, hydrologic; marine; sanitary and environmental; structural; transportation.

Electrical:

communication; electronic power.

Mechanical:

engineering mechanics.

Metallurgy and materials:

ceramic; mining; textile; welding.

Engineering, nec[1]

agricultural; industrial and management; nuclear; ocean engineering; systems

g. **Social sciences** are directed toward an understanding of the behavior of social institutions and groups and of individuals as members of a group. These sciences include anthropology, economics, history, linguistics, political sciences, sociology, and social sciences not elsewhere classified. The following are examples of the disciplines under the fields of social sciences.

Anthropology:

archaeology; cultural and personality; social and ethnology; applied anthropology.

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[1] Not elsewhere classified. Includes multidisciplinary projects within the broad field and single-disciplinary projects for which a separate field has not been assigned.

Economics:

econometrics and economic statistics; history of economic thought; international economics; industrial, labor, and agricultural economics; macroeconomics; microeconomics; public finance and fiscal policy; theory; economic systems and development.

History:

cultural; political, social; history and philosophy of science.

Linguistics:

anthropological-archaeological; computational; psycholinguistics; sociolinguistics.

Political science:

area or regional studies; comparative government; history of political ideas; international relations and law; national political and legal systems; political theory; public administration.

Sociology:

comparative and historical; complex organizations; culture and social structure; demography; group interactions, social problems and social welfare; sociological theory.

Social sciences, nec:

research in law and education not elsewhere classified; socioeconomic geography.

h. **Other sciences not elsewhere classified** includes multidisciplinary and interdisciplinary projects that cannot be classified within one of the above broad fields of science.

(8) GEOGRAPHIC DISTRIBUTION OF 1975 R&D OBLIGATIONS

a. Ten agencies participated in the survey on the geographic distribution of obligations for research and development and R&D plant. These 10 respondents accounted for 97 percent of total Federal R&D and R&D plant obligations in 1975. The respondents were the Departments of Agriculture; Commerce; Defense; the Interior; Transportation; and Health, Education and Welfare; the Energy Research and Development Administration; the Environmental Protection Agency; the National Aeronautics and Space Administration; and the National Science Foundation.

b. Data for 1975 were requested in terms of the principal location (State or outlying area) where the work was performed by the prime contractor, grantee, or intramural organization. Where this information was not available in their records, the respondents were asked to assign the obligations to the State, outlying area, etc. where the prime contractor, grantee, or intramural organization was located.

c. Obligations were reported for research and development as a combined amount.

d. Specifically omitted from the survey were R&D obligations to foreign performers and obligations for R&D plant used in support of foreign performers.

Part II. Scientific and Technical Information

Scientific and technical information consists of knowledge or data resulting from the conduct of research and development or required for organizing, planning, or performing research and development. It encompasses any information in recorded form which presents the status, progress, or results of research and development in any area of science and technology and which has some potential use in furthering the advancement of current and future research and development.

Exclusions:

a. training costs for personnel engaged in scientific and technical information activities;

b. raw scientific and technical data that have not yet been processed for use by professional personnel engaged in research and development (these costs are included in part I of this survey);

c. statistical and general-purpose data that are collected and organized for other than specific use in research and development;

d. information that has been prepared primarily to inform or instruct the general public.

Scientific and technical information activities include all efforts directed to the planning, support, control, performance, and improvement of the functions that cover the acquisition, processing, handling, and communication of scientific and technical information. These may include the acquisition, maintenance, or rental of special equipment primarily for use in connection with scientific and technical information activities. These also include meetings and symposia.

Categories of Scientific and Technical Information Activity

(1) PUBLICATION AND DISTRIBUTION

a. **Primary publication** is defined as all document production tasks performed after the author's manuscript or similar initial recording of the information has been finished and leading to but not including initial issuance or distribution of the finished document. Examples of publication activities: Evaluation of a manuscript; professional writing other than by a scientific investigator or engineer engaged in R&D activities; technical or copy editing and revision not performed by the author; technical drawing and artwork; photographing for use in published material; preparation of final copy for printing, microfilm (including computer output microfilm), or machine readable or other reproduction; and composing, typesetting, proofreading, layout, makeup, printing, mimeographing, and photo duplication.

These publication activities may be concerned with any of the following: journals, technical reports, patents, dissertations, data compilations, proceedings of conferences and symposia, specifications and manuals used in the R&D process, monographs, serials.

Distribution includes functions related to the initial transmission or dissemination of newly documented scientific and technical information from source to user, for example, mailing, shipping, and maintenance of controls.

b. **Patent examination** includes all activities involved in judging the allowability of patent claims. Once a claim is granted, further work on a patent enters the primary publication process under Code 11 above.

c. **Secondary and tertiary** publication is defined as all functions related to the preparation, processing, and putting into final form of such publication as: abstracts, indexes, dictionaries, textbooks, handbooks, bibliographies, reviews, encyclopedias, directories.

Distribution includes functions related to the initial transmission or dissemination of newly documented scientific and technical information from source to user, for example, mailing, shipping, and maintenance of controls.

Excluded from primary, secondary, and tertiary publication are costs of preparing audiovisual aids, such as taped talks, slides, and motion picture films. These are included under audiovisual media and other forms of nonprinted communication.

d. **Support of publications** includes all page charges paid out of Federal funds to primary journals, special subscription arrangements to maintain primary journals, and any other special support mechanisms to assure the viability of certain publications.

(2) DOCUMENTATION, REFERENCE AND INFORMATION SERVICES

a. **Library reference and referral services** includes the acquisition, collection, exchange, loan, and storage of scientific and technical documentary materials. These may be books, periodicals, manuals, reports, microfilms, drawings, phonograph records, movie films, and such reference sources as abstract journals, indexes, and subject heading and title lists.

This category includes rental or acquisition and maintenance of computers and other equipment, and costs of their operations. It includes special retrieval services provided in response to user needs (reprography, SDI, demand bibliographies, etc.), sale and loan of documentary materials, dissemination of documents via mail and personal visits, and liaison activities with users and other information services.

Documentation centers, depositories, clearinghouses, and libraries should be reported under this subcategory (a).

b. **Networking for libraries and documentation centers** covers all costs incurred when two or more geographically separate organizations share their scientific or technical information or data resources through computer and telecommunications linkage.

c. **Specialized information center services** (including technical information analysis center and data bank services) cover the collection, analysis, and evaluation of scientific and technical information and data in well-defined, specialized fields; products may be summaries, reviews, or other compilations. Advisory and other user services are included.

Specialized information centers may be either disciplineor mission-oriented. The services of these centers are distinguished from those of documentation centers, clearinghouses, and libraries, whose functions are primarily concerned with the handling of documents rather than with the technical information contained in the documents.

d. **Networking for specialized information centers** covers all costs incurred when two or more geographically separate organizations share their scientific or technical information or data resources through computer and telecommunications linkage.

e. **Translations** include all costs involved in the translation of documents and other materials from one language to another in support of R&D activities; also the purchase of foreign journals and other materials to be translated.

(3) SYMPOSIA AND AUDIOVISUAL MEDIA

a. **Symposia and technical meetings** include all efforts directed to planning, scheduling, announcing, supporting, sponsoring, conducting, and attending symposia, conferences, and meetings primarily concerned with exchanging and disseminating scientific and technical information. The travel and subsistence of participants in such symposia, conferences, and meetings are covered in these costs.

b. **Audiovisual media and other forms of nonprinted communication** refer to the costs of producing technical and documentary motion picture films, slides, and special photographs for R&D communications purposes, as well as audio and visual aids, such as taped talks, television film, or visual magnetic tape. This category also includes exhibits but excludes media primarily intended for training or public information purposes.

(4) RESEARCH AND DEVELOPMENT IN INFORMATION SCIENCES, DOCUMENTATION AND INFORMATION SYSTEMS, TECHNIQUES AND DEVICES

This category includes the conduct and support of research and development of new and nonconventional methods, techniques, systems, and machines for improving scientific and technical information functions under each of the other three categories, and also includes research and development of a fundamental nature in the area of scientific information. It also covers the conduct and support of studies and surveys to identify broad and specific aspects of scientific information problems. Examples of activities included under this category are as follows:

development and testing of machines, devices, and techniques for storage and retrieval of information and data;
linguistics research focused on information processing;
language and machine translation;
information theory;
artificial intelligence;
logic and switching theory;
operations or systems research on scientific and technical information systems and processes;
documentation or document storage and retrieval;
library science;
network design;
studies of subject classification and indexing schemes; and
studies of scientific and technical information communication systems

Note: Research and development conducted at documentation centers, libraries, and specialized information centers should be included but not the costs associated with establishing new centers or systems once past the development stage. As soon as any new system moves out of the experimental phase and into the operational phase, its costs should be reported under the appropriate category and subcategory above and no longer under this category.

CHANGES IN REPORTING

Responses from the agencies in this survey, as in the previous ones, reflect updating of estimates for the latest two years of the previous report. Such updating is normal in the budgetary cycle. In addition, from time to time responses have reflected reappraisals and revisions in classification of various phases of agencies R&D programs. When this has occurred, the National Science Foundation has revised prior-year data to maintain consistency and comparability with the most recent reporting. Since no statistical inquiry is free of problems of concepts and definitions for the respondents, revisions to improve the reporting are encouraged by NSF. A significant revision in reporting was made by NASA in this present survey.

The character of work totals reported by NASA for the 1975-77 *Federal Funds* survey reflect a major change in the NASA concept of basic research, applied research and development. Most major NASA projects are now categorized entirely as development since they primarily generate outer space technology. In former years substantial portions of these projects were classified by NASA as basic research or applied research. Since NASA programs are sizable, the program shifts have resulted in lower shares for basic research and applied research within the Federal R&D total and a larger share for development. NASA is in the process of revising previously reported R&D totals by character of work so that comparable data are available for historical reference and trend analysis purposes. In this report the revision of data for fiscal years 1963, 1967, 1969, 1971, 1973, 1975, 1976 and 1977 had been completed, and comparable data for fiscal years 1968, 1970, 1972, and 1974 were scheduled for revision and inclusion in the next *Federal Funds* report (Volume XXVI).

LIMITATIONS OF THE DATA

Funds for research, development, and other scientific activities are reported on a 3-year basis comparable with the 1977 budget, upon which the data are based. The respondents have reconciled the data reported here with amounts for scientific activities shown in *The Budget of the United States Government, Fiscal Year 1977*. The amounts reported for each year indicate the obligations or outlays incurred in that year, regardless of when the funds were authorized or received by an agency and regardless of whether or not the funds were identified in the agency's budget specifically for research, development, R&D plant, or scientific and technical information activities.

Data submitted by the Federal agencies for 1975 are considered to be actual since they represent essentially completed transactions. Amounts reported for 1976 and 1977 are estimates in that they are subject to further appropriation, apportionment, or allocation decisions. The actual effects of those and other later actions on 1976 and 1977 outlays and obligations will be reflected in the next report.

It is important to bear in mind that judgment is often necessary in classifying the data. Because of the scope of R&D programs and their multidisciplinary nature, it is difficult to establish consistent criteria for allocating efforts among the character-of-work categories and the various fields of science. Also, funds for R&D activities may not be specifically identified in an agency's budget. However, to meet survey requirements, the participating agencies over the years have developed increasingly consistent systems for classifying R&D data. Revisions resulting from changes in an agency's reporting practices have been incorporated into the historical data to improve the comparability and consistency of the statistical series.

In some cases it has not been possible to report the full cost of research and development. For example, the headquarters costs of planning and administering R&D programs of DOD and ERDA are not included in these reports because these agencies have indicated that it is administratively impracticable to identify the amounts.

R&D plant data reported here are to some extent understated because of the difficulty encountered by some agencies in identifying and reporting this information, particularly DOD and NASA. While DOD reports obligations for R&D plant funded by its construction appropriation, DOD is able to identify only a small portion of the amount of R&D plant support included in R&D contracts that were funded from its RDT&E appropriation. NASA faces similar problems in reporting R&D plant data.

In the area of scientific and technical information, extramural obligations are limited to funds allocated for grants and contracts that are primarily for the support of scientific and technical information activities. As in prior volumes of this series, extramural funds for information activities performed as supplemental, supporting services under R&D grants or contracts have been excluded.

RELATION TO OTHER REPORTS

(1) FEDERAL SUPPORT TO UNIVERSITIES AND COLLEGES

The National Science Foundation prepares reports covering Federal support of individual colleges and universities. These reports are based on data provided by the Federal agencies in response to the reporting system established by the Committee on Academic Science and Engineering (CASE) of the Federal Council for Science and Technology. These reports are referred to in this publication as the CASE reports.

Both the CASE and *Federal Funds* reports provide data on Federal obligations for research and development and R&D plant to universities and colleges and to university-administered Federally Funded Research and Development Centers (FFRDC's). The CASE report, however, is based on obligations of Federal agencies to each individual academic institution, while the *Federal Funds* report is concerned with obligations to universities and colleges as a performer group. The CASE report also includes funds for non-R&D activities, such as science education and nonscience support. Further, the CASE study is based on reports of only 14 agencies (the Departments of Agriculture; Commerce; Defense; Health, Education, and Welfare; Housing and Urban Development; the Interior; Labor; and Transportation; the Energy Research and Development Administration; the Environmental Protection Agency; the National Aeronautics and Space Administration; the National Science Foundation; the Agency for International Development; and the Nuclear Regulatory Commission) while *Federal Funds* is composed of obligations of all agencies. The 14 respondents for CASE account for more than 99 percent of the Federal R&D total to universities and colleges and virtually all obligations to university-administered FFRDC's.

The different reporting procedures have led to different amounts being reported by CASE and *Federal Funds* as follows:

a. The obligations for research and development to universities and colleges reported for *Federal Funds* in 1975 amounted to $2,403 million, or $180 million more than the amount reported for CASE. Part of this difference can be attributed to variations in the amounts reported by the National Institutes of Health (HEW). The *Federal Funds* R&D total for the National Institutes of Health included funds for General Research Support grants, whereas in CASE these were placed under the category of "general support for science," which is a non-R&D area under the CASE definition.

b. The R&D obligation total to university-administered FFRDC's reported for *Federal Funds* was $935 million in 1975, or $143 million less than reported for CASE. For *Federal Funds* $128 million subcontracted by NASA's Jet Propulsion Laboratory was included in ultimate-performer categories (mainly industry) while for CASE the subcontracted amount was included in the R&D obligations to FFRDC's administered by universities.

c. The total R&D plant obligations to universities and colleges reported for *Federal Funds* was $36 million in 1975, or $9 million less than the amount reported for CASE.

d. The total R&D plant obligations to FFRDC's administered by universities and colleges reported for *Federal Funds* was $132 million in 1975, or $3 million more than reported for CASE.

The following factors should also be considered in comparing the data appearing in the two reports:

For *Federal Funds* each agency includes in its own obligations the amounts transferred to other agencies for furtherance of its work, and the receiving agencies do not report funds transferred to them. On the other hand, in the CASE survey, the data are reported by the agency that made the final distribution of the funds to a given institution. Thus, for the CASE survey, agencies included funds received from other agencies, and excluded funds transferred to other agencies, the reverse of the *Federal Funds* process. While such transfers should balance each other out with no resulting changes in total R&D obligations, these varying reporting practices do add to the possibility of differences between the two reports.

The CASE reports, in most instances, are prepared by different operational units within each agency than those that prepare the *Federal Funds* responses. Furthermore, the CASE data are collected several months earlier than the *Federal Funds* statistics. Although, in theory, these conditions in themselves should not lead to reporting differences, in practice differences do arise.

(2) SPECIAL ANALYSES, BUDGET OF THE UNITED STATES

In a section of *Special Analyses, Budget of the United States Government*, the Office of Management and Budget (OMB) publishes estimates of obligations and outlays for research, development, and R&D plant. However, the data in "Special Analysis P: Federal Research and Development Programs" in the 1977 budget do not provide as much detail on character of work or performers as *Federal Funds* and no information on fields of science or geographic distribution.

However, "Special Analysis P" and *Federal Funds* utilize the same definition for research and development and for R&D plant. The estimates for research and development published in the two reports are comparable, even though minor differences do exist. The differences between the two reports are as follows:

Total R&D obligations
[Billions of dollars]

	FY 1975	*FY 1976*	*FY1977*
Federal Funds	$19.0	$21.6	$23.5
Special Analysis P	19.0	21.3	23.5

(3) AN ANALYSIS OF FEDERAL R&D FUNDING BY FUNCTION, FY 1969-77

NSF has published a report under the above title, providing an analysis of Federal R&D obligations by functional categories. The annual *Federal Funds* series, by contrast, reports on Federal R&D obligations by agencies but not by functional categories. The R&D obligations data for 1969-77 in the function report were based on information submitted by the agencies for the *Federal Funds* series. Thus, the overall R&D obligations are the same for the same years covered in both reports.

(4) OTHER REPORTS

a. Individual agencies may classify their R&D programs for purposes other than those for which the *Federal Funds* survey is conducted. Definitions and guidelines that are suitable to those other purposes may result in information that is not comparable with the data transmitted to the Foundation for *Federal Funds*.

b. *The Budget of the United States Government, Fiscal Year 1977* is the source of data on outlays, but the NSF definition of relatively uncontrollable outlays differs from that of OMB in that OMB designates outlays from prior-year contracts and obligations as relatively uncontrollable, whereas NSF considers this category of outlays to be initially controllable and therefore different in concept from fixed-cost and open-ended programs like social security, veterans compensation and pensions, and interest on the national debt.

The latter class of outlays are uncontrollable in that a change in their disbursement requires a change in existing substantive law. All outlays which require appropriation decisions by the Congress, however, are considered by NSF to be relatively controllable; such outlays cover all R&D programs. See *The Budget, 1977*, p. 354.

SOURCES

Data on R&D funds in this report for years prior to 1952 were compiled by the Bureau of the Budget, which later became the Office of Management and Budget, and subsequent data were based on NSF surveys. These data have been published in previous issues of this series, but certain adjustments have been made to achieve comparability with the latest reporting concepts evolved by the agencies.

Supplementing the statistical data collected through the NSF survey of Federal agencies, a variety of sources were used for the text of this report, including the narrative statements submitted by the agencies in the NSF survey, published records of testimony presented by agencies to committees of the Senate and the House, the *1977 Budget Appendix*, and personal contacts with agency respondents.

APPENDIX B

Federally Funded Research and Development Centers, Fiscal Years 1975-77

Department of Defense

OFFICE OF THE SECRETARY OF DEFENSE

Administered by other nonprofit institutions:

Institute for Defense Analyses (IDA)

DEPARTMENT OF THE NAVY

Administered by universities and colleges:

Applied Physics Laboratory (Johns Hopkins University)
Applied Research Laboratory (Pennsylvania State University)
Center for Naval Analyses (University of Rochester)

DEPARTMENT OF THE AIR FORCE

Administered by universities and colleges:

Lincoln Laboratory (Massachusetts Institute of Technology)

Administered by other nonprofit institutions:

Aerospace Corporation
Analytic Services, Inc. (ANSER)
MITRE Corporation
RAND Corporation

Department of Health, Education, and Welfare

NATIONAL INSTITUTES OF HEALTH

Administered by industrial firms:

Frederick Cancer Research Center (Litton Bionetics, Inc., Litton Industries)[1]

Energy Research and Development Administration

Administered by industrial firms:

Bettis Atomic Power Laboratory (Westinghouse Electric Corp.)
Hanford Engineering Development Laboratory (Westinghouse-Hanford Corp.)
Holifield National Laboratory (Union Carbide Corp.)[2]
Idaho National Engineering Laboratory (Aerojet Nuclear Corp.)[3]
Knolls Atomic Power Laboratory (General Electric Company)
Liquid Metal Engineering Center (Rockwell International Corporation)
Mound Laboratory (Monsanto Research Corp.)
Sandia Laboratory (Western Electric Co., Inc.-Sandia Corp.)
Savannah River Laboratory (E.I. du Pont de Nemours & Co., Inc.)

Administered by universities and colleges:

Ames Laboratory (Iowa State University of Science and Technology)
Argonne National Laboratory (University of Chicago and Argonne Universities Assn.)
Brookhaven National Laboratory (Associated Universities, Inc.)
Cambridge Electron Accelerator (Harvard University)[4]
E. O. Lawrence Berkeley Laboratory (University of California)
E. O. Lawrence Livermore Laboratory (University of California)
Fermilab (Universities Research Association, Inc.)[5]
Los Alamos Scientific Laboratory (University of California)
Oak Ridge Associated Universities
Plasma Physics Laboratory (Princeton University)
Stanford Linear Accelerator Center (Stanford University)

Administered by other nonprofit institutions:

Atomic Bomb Casualty Commission (National Academy of Sciences)[6]
Pacific Northwest Laboratory (Battelle Memorial Institute)

National Aeronautics and Space Administration

Administered by universities and colleges:

Jet Propulsion Laboratory (California Institute of Technology)
Space Radiation Effects Laboratory (College of William and Mary)

National Science Foundation

Administered by universities and colleges:

Cerro Tololo Inter-American Observatory (Association of Universities for Research in Astronomy, Inc.)
Kitt Peak National Observatory (Association of Universities for Research in Astronomy, Inc.)
National Astronomy and Ionosphere Center (Cornell University)
National Center for Atmospheric Research (University Corporation for Atmospheric Research)
National Radio Astronomy Observatory (Associated Universities, Inc.)

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[1] Established as an FFRDC in 1975.
[2] Formerly Oak Ridge National Laboratory (Union Carbide Corporation).
[3] Formerly National Reactor Testing Station (Aerojet Nuclear Corp.).
[4] Closed down in 1974. Obligations reported for FY 1974 and 1975 only.
[5] Formerly National Accelerator Laboratory (Universities Research Association, Inc.).
[6] Phased out as an FFRDC in April 1975. Obligations were reported for FY 1975 only.

APPENDIX C

Statistical Tables
Part 1

Federal Funds for Research, Development and R&D Plant

RESEARCH, DEVELOPMENT, AND R&D PLANT

C-1. Overall summary: fiscal years 1975, 1976, and 1977 ....
C-2. By agency: fiscal years 1975, 1976, and 1977 ....

RESEARCH AND DEVELOPMENT—AGENCY, CHARACTER OF WORK, AND PERFORMER

C-3. By agency: fiscal years 1975, 1976, and 1977 ..
C-4. By agency and character of work: fiscal year 1975 ....
C-5. By agency and character of work: fiscal year 1976 (estimated) ....
C-6. By agency and character of work: fiscal year 1977 (estimated) ....
C-7. By agency and performer: fiscal year 1975 ...
C-8. By agency and performer: fiscal year 1976 (estimated) ....
C-9. By agency and performer: fiscal year 1977 (estimated) ....

TOTAL RESEARCH—AGENCY, PERFORMER, AND FIELD OF SCIENCE

C-10. By agency and performer: fiscal year 1975 ...
C-11. By agency and performer: fiscal year 1976 (estimated) ....
C-12. By agency and performer: fiscal year 1977 (estimated) ....
C-13. By detailed field of science: fiscal years 1975, 1976, and 1977 ....
C-14. By agency and field of science: fiscal year 1975 ....
C-15. By agency and field of science: fiscal year 1976 (estimated) ....
C-16. By agency and field of science: fiscal year 1977 (estimated) ....
C-17. Psychology and physical sciences, by agency and detailed field of science: fiscal year 1975 ....
C-18. Psychology and physical sciences: by agency and detailed field of science: fiscal year 1976 (estimated) ....

C-19. Psychology and physical sciences, by agency and detailed field of science: fiscal year 1977 (estimated)
C-20. Life and environmental sciences, by agency and detailed field of science: fiscal year 1975
C-21. Life and environmental sciences, by agency and detailed field of science: fiscal year 1976 (estimated)
C-22. Life and environmental sciences, by agency and detailed field of science: fiscal year 1977 (estimated)
C-23. Engineering, by agency and detailed field of science: fiscal year 1975
C-24. Engineering, by agency and detailed field of science: fiscal year 1976 (estimated)
C-25. Engineering, by agency and detailed field of science: fiscal year 1977 (estimated)
C-26. Social sciences, by agency and detailed field of science: fiscal year 1975
C-27. Social sciences, by agency and detailed field of science: fiscal year 1976 (estimated)
C-28. Social sciences, by agency and detailed field of science: fiscal year 1977 (estimated)

BASIC RESEARCH—AGENCY, PERFORMER, AND FIELD OF SCIENCE

C-29. By agency and performer: fiscal year 1975
C-30. By agency and performer: fiscal year 1976 (estimated)
C-31. By agency and performer: fiscal year 1977 (estimated)
C-32. By detailed field of science: fiscal years 1975, 1976, and 1977
C-33. By agency and field of science: fiscal year 1975
C-34. By agency and field of science: fiscal year 1976 (estimated)
C-35. By agency and field of science: fiscal year 1977 (estimated)
C-36. Psychology and physical sciences, by agency and detailed field of science: fiscal year 1975
C-37. Psychology and physical sciences, by agency and detailed field of science: fiscal year 1976 (estimated)
C-38. Psychology and physical sciences, by agency and detailed field of science: fiscal year 1977 (estimated)
C-39. Life and environmental sciences, by agency and detailed field of science: fiscal year 1975
C-40. Life and environmental sciences, by agency and detailed field of science: fiscal year 1976 (estimated)
C-41. Life and environmental sciences, by agency and detailed field of science: fiscal year 1977 (estimated)
C-42. Engineering, by agency and detailed field of science: fiscal year 1975
C-43. Engineering, by agency and detailed field of science: fiscal year 1976 (estimated)
C-44. Engineering, by agency and detailed field of science: fiscal year 1977 (estimated)
C-45. Social sciences, by agency and detailed field of science: fiscal year 1975
C-46. Social sciences, by agency and detailed field of science: fiscal year 1976 (estimated)
C-47. Social sciences, by agency and detailed field of science: fiscal year 1977 (estimated)

APPLIED RESEARCH—AGENCY, PERFORMER, AND FIELD OF SCIENCE

C-48. By agency and performer: fiscal year 1975
C-49. By agency and performer: fiscal year 1976 (estimated)
C-50. By agency and performer: fiscal year 1977 (estimated)
C-51. By detailed field of science: fiscal years 1975, 1976, and 1977
C-52. By agency and field of science: fiscal year 1975
C-53. By agency and field of science: fiscal year 1976 (estimated)
C-54. By agency and field of science: fiscal year 1977 (estimated)
C-55. Psychology and physical sciences, by agency and detailed field of science: fiscal year 1975
C-56. Psychology and physical sciences, by agency and detailed field of science: fiscal year 1976 (estimated)
C-57. Psychology and physical sciences, by agency and detailed field of science: fiscal year 1977 (estimated)
C-58. Life and environmental sciences, by agency and detailed field of science: fiscal year 1975
C-59. Life and environmental sciences, by agency and detailed field of science: fiscal year 1976 (estimated)
C-60. Life and environmental sciences, by agency and detailed field of science: fiscal year 1977 (estimated)
C-61. Engineering, by agency and detailed field of science: fiscal year 1975
C-62. Engineering, by agency and detailed field of science: fiscal year 1976 (estimated)
C-63. Engineering, by agency and detailed field of science: fiscal year 1977 (estimated)
C-64. Social sciences, by agency and detailed field of science: fiscal year 1975
C-65. Social sciences, by agency and detailed field of science: fiscal year 1976 (estimated)
C-66. Social sciences, by agency and detailed field of science: fiscal year 1977 (estimated)

DEVELOPMENT—AGENCY AND PERFORMER

C-67. By agency and performer: fiscal year 1975
C-68. By agency and performer: fiscal year 1976 (estimated)
C-69. By agency and performer: fiscal year 1977 (estimated)

R&D PLANT

C-70. By agency: fiscal years 1975, 1976, and 1977
C-71. By agency and performer of the R&D the plant supports: fiscal year 1975
C-72. By agency and performer of the R&D the plant supports: fiscal year 1976 (estimated)
C-73. By agency and performer of the R&D the plant supports: fiscal year 1977 (estimated)

TOTAL RESEARCH PERFORMED AT UNIVERSITIES AND COLLEGES—AGENCY AND FIELD OF SCIENCE

C-74. By detailed field of science: fiscal years 1975, 1976, and 1977
C-75. By agency and field of science; fiscal year 1975
C-76. Psychology and physical sciences, by agency and detailed field of science: fiscal year 1975
C-77. Life and environmental sciences, by agency and detailed field of science: fiscal year 1975
C-78. Engineering, by agency and detailed field of science: fiscal year 1975
C-79. Social sciences, by agency and detailed field of science: fiscal year 1975

BASIC RESEARCH PERFORMED AT UNIVERSITIES AND COLLEGES—AGENCY AND FIELD OF SCIENCE

C-80. By detailed field of science: fiscal years 1975, 1976, and 1977 ....
C-81. By agency and field of science: fiscal year 1975 ....
C-82. Psychology and physical sciences, by agency and detailed field of science: fiscal year 1975 ....
C-83. Life and environmental sciences, by agency and detailed field of science: fiscal year 1975 ....
C-84. Engineering, by agency and detailed field of science: fiscal year 1975 ....
C-85. Social sciences, by agency and detailed field of science: fiscal year 1975 ....

APPLIED RESEARCH PERFORMED AT UNIVERSITIES AND COLLEGES—AGENCY AND FIELD OF SCIENCE

C-86. By detailed field of science: fiscal years 1975, 1976, and 1977 ....
C-87. By agency and field of science, fiscal year 1975 ....
C-88. Psychology and physical sciences, by agency and detailed field of science: fiscal year 1975 ....
C-89. Life and environmental sciences, by agency and detailed field of science: fiscal year 1975 ....
C-90. Engineering, by agency and detailed field of science: fiscal year 1975 ....
C-91. Social sciences, by agency and detailed field of science: fiscal year 1975 ....

FOREIGN PERFORMERS—RESEARCH AND DEVELOPMENT

C-92. By region, country, and agency: fiscal year 1975 ....
C-93. By region, country, and agency: fiscal year 1976 (estimated) ....

FOREIGN PERFORMERS—BASIC RESEARCH

C-94. By region, country, and agency: fiscal year 1975 ....
C-95. By region, country, and agency: fiscal year 1976 (estimated) ....

SPECIAL FOREIGN CURRENCY PROGRAM

C-96. For research and development, by agency: fiscal years 1975, 1976, and 1977 ....
C-97. For basic research, by agency: fiscal year 1975, 1976, and 1977 ....
C-98. For applied research by agency: fiscal years 1975, 1976, and 1977 ....
C-99. For development, by agency: fiscal years 1975, 1976, and 1977 ....

GEOGRAPHIC DISTRIBUTION—RESEARCH AND DEVELOPMENT AND R&D PLANT

C-100. Research, development, and R&D plant, by geographic division and State: fiscal year 1975 ....
C-101. Research and development, by State and performer: fiscal year 1975 ....
C-101A. Percent distribution to each performer, by State: fiscal year 1975 ....
C-101B. Percent distribution to each State, by performer: fiscal year 1975 ....
C-102. Research and development, by State and agency: fiscal year 1975 ....
C-102A. Percent distribution of each agency, by State: fiscal year 1975 ....
C-102B. Percent distribution of each State, by agency: fiscal year 1975 ....
C-103. Research and development, by geographic division, State, agency, and performer: fiscal year 1975 ....
C-104. R&D plant, by geographic division, State, and performer supported: fiscal year 1975 ....
C-105. R&D plant, by geographic division, State, and agency: fiscal year 1975 ....

FEDERAL INTRAMURAL PERSONNEL COSTS

C-106. Total research and development, by agency: fiscal years 1975, 1976, and 1977 ....
C-107. Basic research, by agency: fiscal years 1975, 1976, and 1977 ....
C-108. Applied research, by agency: fiscal years 1975, 1976, and 1977 ....
C-109. Development, by agency: fiscal years 1975, 1976, and 1977 ....

HISTORICAL DATA

Outlays

C-110. Research, development, and R&D plant, by agency: fiscal years 1967-77 ....
C-111. Research and development, by agency: fiscal years 1967-77 ....
C-112. R&D plant, by agency: fiscal years 1967-77 ...

Obligations

C-113. Research, development, and R&D plant, by agency: fiscal years 1967-77 ....
C-114. Research and development, by agency: fiscal years 1967-77 ....
C-115. R&D plant, by agency: fiscal years 1967-77 ...
C-116. Research and development, by character of work and R&D plant: selected fiscal years 1967-77 ....
C-117. Total research, by selected agency: selected fiscal years 1967-77 ....
C-118. Basic research, by selected agency: selected fiscal years 1967-77 ....
C-119. Applied research, by selected agency: selected fiscal years 1967-77 ....
C-120. Development, by selected agency: selected fiscal years 1967-77 ....
C-121. Research and development, by performer: fiscal years 1967-77 ....
C-122. Total research, by performer: selected fiscal years 1967-77 ....
C-123. Basic research, by performer: selected fiscal years 1967-77 ....
C-124. Applied research by performer: selected fiscal years 1967-77 ....
C-125. Development by performer: selected fiscal years 1967-77 ....
C-126. Total research, by field of science: selected fiscal years 1967-77 ....
C-127. Basic research, by field of science: selected fiscal years 1967-77 ....
C-128. Applied research, by field of science: selected fiscal years 1967-77 ....
C-129. Research and development, by geographic division and State: fiscal years 1965, 1968, 1969, 1970, 1971, 1972, 1973, 1974, and 1975 ....
C-130. R&D plant, by geographic division and State: fiscal years 1965, 1968, 1969, 1970, 1971, 1972, 1973, 1974, and 1975 ....

NOTES

- Estimates for 1977 are based on *The Budget, FY 1977*, as submitted to Congress, and do not reflect subsequent appropriations and apportionment actions.
- Details may not add to totals because of rounding.
- Asterisks appearing in lieu of figures indicate that the amounts are less than $50,000.
- The abbreviation "FFRDC" appearing in statistical tables refers to Federally Funded Research and Development Centers.
- Defense Agencies within the Department of Defense include the Defense Advanced Research Projects Agency, the Defense Nuclear Agency, and the Defense Communications Agency.
- Departmentwide Funds of the Department of Defense cover the Defense Civil Preparedness Agency.
- The R&D data of the Energy Research and Development Administration reflect obligations or outlays rather than accrued costs, as was the case in previous reports.
- In tables showing extramural performers, obligations to agricultural experiment stations are included within obligations to universities and colleges.
- Within the Department of Commerce, data formerly reported under the Social and Economic Statistics Administration are now reported under the Bureau of the Census.
- Within the Department of Labor the former Manpower Administration has been renamed the Employment and Training Administration.
- Historical data appearing in these tables for overall research and development and R&D plant cover all fiscal years between 1967 and 1977. Historical data for basic research, applied research, and development cover only fiscal years 1967, 1969, 1971, 1973, and 1975-77. The reason is that NASA programs have been reclassified by character of work. Most of the major NASA projects are now categorized entirely as development. In former years substantial portions of these projects were classified as research, either basic or applied. The NASA prior-year data have been partially readjusted to reflect these changes. Omitted past years 1968, 1970, 1972, and 1974 will be included in next year's *Appendix Tables C and D* for *Federal Funds*, Volume XXVI.
- **The current appendix tables providing data on basic research, applied research, and development for fiscal years 1975, 1976 and 1977 are** *not* **comparable with data for those categories in appendix tables issued to accompany earlier** *Federal Funds* **reports. For trend comparisons, use only these** *Appendix Tables C and D* **for Volume XXV and not any earlier ones.**

Table C-1.—Summary of Federal funds for research, development, and R&D plant: fiscal years 1975, 1976, and 1977

[Millions of dollars]

Item	Actual	Estimates	
	1975	1976	1977
TOTAL OUTLAYS FOR RESEARCH, DEVELOPMENT, AND R&D PLANT	19,589.7	21,378.8	23,595.9
Research and Development	18,760.1	20,480.2	22,710.8
R&D Plant	829.7	898.6	885.1
TOTAL OBLIGATIONS FOR RESEARCH, DEVELOPMENT, AND R&D PLANT	19,865.0	22,512.5	24,726.9
Research and Development	19,044.3	21,624.7	23,487.6
Total Research	6,929.2	7,568.3	7,850.7
Basic research	2,145.8	2,345.1	2,519.5
Applied research	4,783.4	5,223.2	5,331.2
Development	12,115.1	14,056.4	15,636.9
R&D Plant	820.7	887.8	1,239.3
Research and Development			
Performers			
Federal intramural[1]	5,394.9	5,923.4	6,060.2
Industrial firms	8,385.3	9,917.0	11,346.6
FFRDC's administered by industrial firms	728.6	859.3	961.1
Universities and colleges	2,402.7	2,568.7	2,643.2
FFRDC's administered by universities and colleges	935.1	1,064.9	1,175.4
Nonprofit institutions	717.8	743.0	706.5
FFRDC's administered by nonprofit institutions	219.9	230.1	267.2
State and local governments	198.3	234.8	246.8
Foreign	61.6	83.4	80.5
Research			
Performers			
Federal intramural[1]	2,412.3	2,590.6	2,676.5
Industrial firms	1,267.1	1,411.0	1,500.0
FFRDC's administered by industrial firms	140.9	179.0	196.6
Universities and colleges	2,140.9	2,259.6	2,324.0
FFRDC's administered by universities and colleges	421.0	476.9	508.2
Nonprofit institutions	390.9	434.4	429.4
FFRDC's administered by nonprofit institutions	64.5	63.1	63.6
State and local governements	86.6	92.7	101.5
Foreign	40.9	61.0	50.9
Fields of science			
Life sciences	2,449.9	2,708.5	2,698.2
Psychology	133.6	132.5	137.2
Physical sciences	1,025.2	1,103.6	1,194.3
Environmental sciences	652.8	693.0	745.0
Mathematics	136.2	142.9	154.5
Engineering	2,041.4	2,209.9	2,306.0
Social sciences	303.4	364.2	382.9
Other Sciences	186.7	213.6	232.5
Basic Research			
Performers			
Federal intramural[1]	644.7	692.3	727.1
Industrial firms	72.4	89.8	123.3
FFRDC's administered by industrial firms	32.9	35.7	38.7
Universities and colleges	1,065.4	1,156.5	1,242.9
FFRDC's administered by universities and colleges	205.2	230.8	239.8
Basic Research—Continued			
Nonprofit institutions	97.3	108.2	112.5
FFRDC's administered by nonprofit institutions	4.3	4.3	4.8
State and local governments	11.8	13.9	14.1
Foreign	11.8	13.6	16.4
Fields of science			
Life sciences	776.0	876.9	908.6
Psychology	48.5	50.6	53.1
Physical sciences	616.0	659.6	718.4
Environmental sciences	331.1	356.9	389.7
Mathematics	58.5	62.4	70.5
Engineering	227.9	238.4	266.4
Social sciences	72.8	87.0	98.9
Other sciences	15.0	13.4	13.8
Applied Research			
Performers			
Federal intramural[1]	1,767.5	1,898.3	1,949.4
Industrial firms	1,194.8	1,321.2	1,376.8
FFRDC's administered by industrial firms	108.0	143.4	157.9
Universities and colleges	1,039.5	1,103.2	1,081.1
FFRDC's administered by universities and colleges	215.8	246.1	268.4
Nonprofit institutions	293.6	326.2	316.9
FFRDC's administered by nonprofit institutions	60.3	58.7	58.8
State and local governments	74.8	78.8	87.4
Foreign	29.1	47.3	34.5
Fields of science			
Life sciences	1,673.9	1,831.6	1,789.6
Psychology	85.1	81.9	84.2
Physical sciences	409.2	444.0	475.9
Environmental sciences	321.7	336.2	355.4
Mathematics	77.6	80.5	84.0
Engineering	1,813.5	1,971.5	2,039.6
Social sciences	230.6	277.2	284.0
Other sciences	171.7	200.2	218.7
Development			
Performers			
Federal intramural[1]	2,982.7	3,332.9	3,383.7
Industrial firms	7,118.2	8,506.0	9.846.5
FFRDC's administered by industrial firms	587.7	680.3	764.5
Universities and colleges	297.9	309.1	319.2
FFRDC's administered by universities and colleges	514.1	588.0	667.2
Nonprofit institutions	326.9	308.5	277.1
FFRDC's administered by nonprofit institutions	155.4	167.0	203.6
State and local governments	111.6	142.1	145.3
Foreign	20.6	22.5	29.7
R&D Plant			
Performers supported			
Federal intramural	346.8	387.9	545.8
Industrial firms	62.3	95.3	144.4
FFRDC's administered by industrial firms	229.7	205.6	212.5
Universities and colleges	35.9	31.1	33.3
FFRDC's administered by universities and colleges	131.8	158.0	292.6
Nonprofit institutions	10.5	6.2	4.9
FFRDC's administered by nonprofit institutions	3.6	3.8	5.8
State and local governments	.2	([2])	([2])
Foreign	([2])	—	—

[1] Intramural activities cover costs associated with the administration of intramural and extramural programs by Federal personnel as well as actual intramural performance.

[2] Less than $50,000.

Source: National Science Foundation.

TABLE C-2. FEDERAL FUNDS FOR RESEARCH, DEVELOPMENT, AND R&D PLANT, BY AGENCY: FISCAL YEARS 1975, 1976, AND 1977

(MILLIONS OF DOLLARS)

AGENCY AND SUBDIVISION	OBLIGATIONS			OUTLAYS		
	ACTUAL,	ESTIMATES		ACTUAL,	ESTIMATES	
	1975	1976	1977	1975	1976	1977
TOTAL, ALL AGENCIES	19,865.0	22,512.5	24,726.9	19,589.7	21,378.8	23,595.9
DEPARTMENTS						
DEPARTMENT OF AGRICULTURE, TOTAL	427.9	514.1	506.1	425.6	500.7	518.6
AGRICULTURAL RESEARCH SERVICE	221.6	285.0	269.5	232.8	269.9	282.9
COOPERATIVE STATE RESEARCH SERVICE	101.1	114.2	122.3	95.6	111.9	123.8
ECONOMIC RESEARCH SERVICE	21.3	24.7	25.0	22.2	24.7	25.0
FARMER COOPERATIVE SERVICE	1.2	1.3	1.3	1.2	1.3	1.3
FOREST SERVICE	81.5	86.9	85.9	72.5	90.9	83.6
NATIONAL AGRICULTURAL LIBRARY	*	*	*	.1	.1	*
STATISTICAL REPORTING SERVICE	1.2	2.0	2.0	1.2	2.0	2.0
DEPARTMENT OF COMMERCE, TOTAL	224.9	246.5	239.0	224.6	239.6	230.1
BUREAU OF THE CENSUS	1.0	1.2	1.3	1.0	1.2	1.3
ECONOMIC DEVELOPMENT ADMINISTRATION	10.3	15.0	6.4	15.0	14.7	11.9
MARITIME ADMINISTRATION	23.9	22.4	21.5	27.9	28.9	19.2
NATIONAL BUREAU OF STANDARDS	44.6	50.8	50.3	47.2	48.4	50.4
NATIONAL FIRE PREVENTION AND CONTROL ADMINISTRATION	3.6	6.4	6.1	2.4	4.7	4.2
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATON	135.1	147.2	149.5	127.7	136.8	139.6
OFFICE OF MINORITY BUSINESS ENTERPRISE	4.6	1.9	1.9	1.8	3.6	1.9
OFFICE OF TELECOMMUNICATIONS	1.3	1.2	1.4	1.1	1.1	1.2
PATENT AND TRADEMARK OFFICE	.5	.4	.4	.5	.4	.4
DEPARTMENT OF DEFENSE, TOTAL	9,179.6	10,084.6	11,584.4	9,363.5	9,684.4	10,969.0
DEPARTMENT OF THE ARMY	1,920.7	2,093.1	2,465.2	2,083.0	2,071.5	2,405.7
MILITARY FUNCTIONS	1,907.9	2,078.0	2,450.2	2,070.2	2,056.3	2,390.6
RDT&E APPROPRIATIONS	1,805.5	1,973.9	2,331.7	1,964.4	1,948.0	2,287.0
PAY AND ALLOWANCES OF MILITARY PERSONNEL IN R&D	86.7	89.4	94.2	84.1	89.3	92.1
MILITARY CONSTRUCTION	15.6	14.7	24.3	21.7	19.0	11.5
CIVIL FUNCTIONS	12.8	15.2	15.0	12.8	15.2	15.0
DEPARTMENT OF THE NAVY	3,162.8	3,450.0	4,027.7	3,126.3	3,268.3	4,118.5
RDT&E APPROPRIATIONS	3,042.7	3,332.0	3,916.7	3,021.0	3,145.0	4,007.0
PAY AND ALLOWANCES OF MILITARY PERSONNEL IN R&D	90.6	95.8	98.0	90.3	95.9	97.0
MILITARY CONSTRUCTION	27.5	18.7	10.4	13.8	24.6	11.4
SPECIAL FOREIGN CURRENCY PROGRAM	2.1	2.5	2.6	1.2	2.8	3.1
DEPARTMENT OF THE AIR FORCE	3,573.1	3,895.1	4,365.0	3,567.6	3,697.1	3,740.3
RDT&E APPROPRIATIONS	3,313.2	3,616.0	3,916.3	3,310.9	3,419.0	3,448.0
PAY AND ALLOWANCES OF MILITARY PERSONNEL IN R&D	241.5	242.9	240.1	241.5	242.9	240.1
MILITARY CONSTRUCTION	18.4	36.1	208.6	15.1	35.2	52.2
DEFENSE AGENCIES	497.4	616.8	695.6	556.9	619.8	677.2
RDT&E APPROPRIATIONS	490.5	609.5	682.0	550.3	611.7	669.8
PAY AND ALLOWANCES OF MILITARY PERSONNEL IN R&D	6.5	7.4	7.3	6.5	7.4	7.3
MILITARY CONSTRUCTION	*	*	6.3	.1	.8	.2
DEPARTMENTWIDE FUNDS	1.7	1.7	1.0	3.0	2.0	1.0
DIRECTOR OF TEST AND EVALUATION, DEFENSE	23.9	27.9	29.9	26.8	25.7	26.3
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, TOTAL	2,414.3	2,637.9	2,580.7	2,178.3	2,430.7	2,558.6
ALCOHOL, DRUG ABUSE AND MENTAL HEALTH ADMINISTRATION	139.4	142.6	127.8	114.1	134.5	129.4
CENTER FOR DISEASE CONTROL	42.6	50.7	52.9	44.6	48.9	40.1
FOOD AND DRUG ADMINISTRATION	36.6	41.8	38.2	28.3	30.7	30.0
HEALTH RESOURCES ADMINISTRATION	43.3	34.9	34.9	63.2	34.7	29.9
HEALTH SERVICES ADMINISTRATION	17.3	15.9	13.2	9.9	17.0	14.9
NATIONAL INSTITUTE OF EDUCATION	69.9	70.0	90.0	82.8	70.0	88.0
NATIONAL INSTITUTES OF HEALTH	1,883.9	2,060.0	1,992.9	1,684.4	1,902.7	2,010.0
OFFICE OF EDUCATION	45.9	78.5	88.8	53.1	56.3	77.7
OFFICE OF HUMAN DEVELOPMENT	64.3	70.3	62.0	47.2	60.2	63.4
OFFICE OF THE ASSISTANT SECRETARY FOR EDUCATION	12.6	13.1	13.1	10.6	11.5	11.1
OFFICE OF THE SECRETARY	26.2	25.0	30.6	8.7	32.5	29.6
SOCIAL AND REHABILITATION SERVICE	9.6	9.2	9.2	10.1	9.2	9.2
SOCIAL SECURITY ADMINISTRATION	22.6	25.9	27.0	21.3	22.5	25.2
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT	62.0	68.1	77.7	58.7	63.3	73.8
DEPARTMENT OF THE INTERIOR, TOTAL	284.7	331.0	313.7	244.6	306.6	308.1
BONNEVILLE POWER ADMINISTRATION	6.1	8.7	4.0	3.7	10.3	4.7
BUREAU OF LAND MANAGEMENT	.8	.8	1.0	.5	.8	1.0
BUREAU OF MINES	101.6	139.0	129.2	76.7	118.4	129.1
BUREAU OF OUTDOOR RECREATION	*	*	*	*	*	*
BUREAU OF RECLAMATION	7.8	8.6	8.0	8.0	9.0	8.2
GEOLOGICAL SURVEY	114.5	118.4	114.8	101.9	117.2	114.8
NATIONAL PARK SERVICE	8.4	9.3	9.6	8.4	9.3	9.6
OFFICE OF THE SECRETARY	1.7	2.5	1.7	1.1	1.8	1.5
OFFICE OF WATER RESEARCH AND TECHNOLOGY	19.5	20.9	22.3	23.0	19.0	18.2
UNITED STATES FISH AND WILDLIFE SERVICE	24.4	22.9	23.1	21.3	20.7	21.0
DEPARTMENT OF JUSTICE, TOTAL	44.3	61.8	42.5	43.8	49.8	42.9
BUREAU OF PRISONS	.6	.9	1.9	.6	.9	1.8
DRUG ENFORCEMENT ADMINISTRATION	1.5	5.6	4.3	3.4	4.7	3.6
FEDERAL BUREAU OF INVESTIGATION	1.2	1.2	1.4	.6	1.0	.6
IMMIGRATION AND NATURALIZATION SERVICE	.1	.3	.4	.1	.3	.4
LAW ENFORCEMENT ASSISTANCE ADMINISTRATION	40.9	53.7	34.5	39.2	43.0	36.6

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TABLE C-2. FEDERAL FUNDS FOR RESEARCH, DEVELOPMENT, AND R&D PLANT, BY AGENCY: FISCAL YEARS 1975, 1976, AND 1977

(MILLIONS OF DOLLARS)

- CONTINUED

AGENCY AND SUBDIVISION	OBLIGATIONS			OUTLAYS		
	ACTUAL,	ESTIMATES		ACTUAL,	ESTIMATES	
	1975	1976	1977	1975	1976	1977
DEPARTMENT OF LABOR, TOTAL	25.4	30.1	34.2	25.4	30.1	34.2
BUREAU OF LABOR STATISTICS	1.8	1.4	1.7	1.8	1.4	1.7
EMPLOYMENT AND TRAINING ADMINISTRATION	15.5	15.8	15.8	15.5	15.8	15.8
EMPLOYMENT STANDARDS ADMINISTRATION	3.2	5.4	5.5	3.2	5.4	5.5
LABOR-MANAGEMENT SERVICES ADMINISTRATION	.8	2.8	2.8	.8	2.8	2.8
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION	2.0	2.3	6.3	2.0	2.3	6.3
OFFICE OF THE SECRETARY	2.0	2.4	2.2	2.0	2.4	2.2
DEPARTMENT OF STATE, TOTAL	27.9	31.5	33.4	28.6	24.9	26.6
DEPARTMENTAL FUNDS	1.2	1.5	1.5	1.2	1.5	1.5
AGENCY FOR INTERNATIONAL DEVELOPMENT	26.7	30.0	31.9	27.4	23.4	25.0
DEPARTMENT OF TRANSPORTATION, TOTAL	324.8	392.6	368.1	339.2	382.3	347.5
FEDERAL AVIATION ADMINISTRATION	109.0	106.3	112.2	113.7	118.0	109.9
FEDERAL HIGHWAY ADMINISTRATION	45.1	47.6	41.6	26.8	54.9	42.8
FEDERAL RAILROAD ADMINISTRATION	39.4	81.3	53.0	51.1	54.7	41.8
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION	34.0	49.2	42.5	36.2	46.6	40.8
OFFICE OF THE SECRETARY	31.3	33.7	29.9	34.5	34.1	29.1
UNITED STATES COAST GUARD	16.5	18.6	19.0	16.1	18.5	18.5
URBAN MASS TRANSPORTATION ADMINISTRATION	49.4	56.0	70.0	60.9	55.5	64.6
DEPARTMENT OF THE TREASURY, TOTAL	1.7	1.8	1.6	1.7	1.8	1.6
BUREAU OF ENGRAVING AND PRINTING	1.7	1.8	1.6	1.7	1.8	1.6
OTHER AGENCIES						
ACTION	.2	.4	.1	*	.5	*
ADVISORY COMMISSION ON INTERGOVERNMENTAL RELATIONS	1.2	1.3	1.4	1.1	1.4	1.4
CIVIL AERONAUTICS BOARD	.4	.5	.5	.4	.5	.5
CIVIL SERVICE COMMISSION	4.4	4.7	3.9	4.4	4.7	3.9
COMMUNITY SERVICES ADMINISTRATION	48.0	39.0	39.0	49.4	39.0	39.0
CONSUMER PRODUCT SAFETY COMMISSION	7.9	6.0	6.4	7.9	6.0	6.4
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION	2,464.8	3,241.6	3,918.9	2,271.5	2,805.3	3,479.5
ENVIRONMENTAL PROTECTION AGENCY	259.7	318.5	250.3	218.6	327.9	303.0
FEDERAL COMMUNICATIONS COMMISSION	1.1	2.0	1.6	.8	1.9	1.6
FEDERAL ENERGY ADMINISTRATION	1.3	3.0	6.1	1.0	3.3	5.6
FEDERAL HOME LOAN BANK BOARD	.7	.8	.8	.7	.8	.8
FEDERAL TRADE COMMISSION	.9	1.2	1.3	.9	1.2	1.3
GENERAL SERVICES ADMINISTRATION	1.8	1.2	2.8	1.7	1.4	2.8
LIBRARY OF CONGRESS	2.6	3.0	3.6	2.5	3.0	3.4
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION	3,207.1	3,530.1	3,670.7	3,266.5	3,517.2	3,676.0
NATIONAL SCIENCE FOUNDATION	618.1	664.3	740.7	600.4	651.8	679.8
NUCLEAR REGULATORY COMMISSION	67.2	110.6	122.4	58.5	96.3	106.5
OFFICE OF TELECOMMUNICATIONS POLICY	4.1	3.1	2.7	4.1	3.1	2.7
SMALL BUSINESS ADMINISTRATION	.2	.6	.6	.2	.6	.6
SMITHSONIAN INSTITUTION	25.2	28.0	33.8	24.9	29.5	31.6
SPECIAL ACTION OFFICE FOR DRUG ABUSE PREVENTION	3.8	*	*	14.9	9.2	*
TENNESSEE VALLEY AUTHORITY	28.8	35.0	30.5	27.2	42.1	31.0
UNITED STATES ARMS CONTROL AND DISARMAMENT AGENCY	1.0	1.6	2.3	1.0	1.6	2.3
UNITED STATES INFORMATION AGENCY	.1	.1	.1	.1	.1	.1
VETERANS ADMINISTRATION	97.0	115.8	105.2	97.0	115.8	105.2

* INDICATES AMOUNT LESS THAN $50,000.

SOURCE: NATIONAL SCIENCE FOUNDATION.

TABLE C-3. FEDERAL FUNDS FOR TOTAL RESEARCH AND DEVELOPMENT, BY AGENCY: FISCAL YEARS 1975, 1976, AND 1977

(MILLIONS OF DOLLARS)

AGENCY AND SUBDIVISION	OBLIGATIONS			OUTLAYS		
	ACTUAL,	ESTIMATES		ACTUAL,	ESTIMATES	
	1975	1976	1977	1975	1976	1977
TOTAL, ALL AGENCIES	19,044.3	21,624.7	23,487.6	18,760.1	20,480.2	22,710.8
DEPARTMENTS						
DEPARTMENT OF AGRICULTURE, TOTAL	420.1	478.4	502.8	417.7	486.2	510.5
AGRICULTURAL RESEARCH SERVICE	217.1	254.8	266.5	228.8	259.6	275.1
COOPERATIVE STATE RESEARCH SERVICE	101.1	114.2	122.3	95.5	111.9	123.8
ECONOMIC RESEARCH SERVICE	21.3	24.7	25.0	22.2	24.7	25.0
FARMER COOPERATIVE SERVICE	1.2	1.3	1.3	1.2	1.3	1.3
FOREST SERVICE	78.2	81.4	85.7	68.6	86.7	83.4
NATIONAL AGRICULTURAL LIBRARY	*	*	*	.1	.1	*
STATISTICAL REPORTING SERVICE	1.2	2.0	2.0	1.2	2.0	2.0
DEPARTMENT OF COMMERCE, TOTAL	215.4	238.8	235.4	214.1	232.3	226.6
BUREAU OF THE CENSUS	1.0	1.2	1.3	1.0	1.2	1.3
ECONOMIC DEVELOPMENT ADMINISTRATION	10.3	15.0	6.4	15.0	14.7	11.9
MARITIME ADMINISTRATION	22.9	21.4	19.6	27.1	28.1	17.7
NATIONAL BUREAU OF STANDARDS	43.2	49.6	50.1	45.3	46.9	49.7
NATIONAL FIRE PREVENTION AND CONTROL ADMINISTRATION	3.6	6.4	6.1	2.4	4.7	4.2
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATON	128.0	141.7	148.0	119.8	131.7	138.2
OFFICE OF MINORITY BUSINESS ENTERPRISE	4.6	1.9	1.9	1.8	3.6	1.9
OFFICE OF TELECOMMUNICATIONS	1.3	1.2	1.4	1.1	1.1	1.2
PATENT AND TRADEMARK OFFICE	.5	.4	.4	.5	.4	.4
DEPARTMENT OF DEFENSE, TOTAL	9,012.5	9,905.0	11,225.2	9,210.6	9,496.4	10,787.6
DEPARTMENT OF THE ARMY	1,896.7	2,067.3	2,425.4	2,053.1	2,042.6	2,380.6
MILITARY FUNCTIONS	1,885.2	2,055.0	2,412.9	2,041.6	2,030.4	2,368.1
RDT&E APPROPRIATIONS	1,798.5	1,965.7	2,318.7	1,957.4	1,941.1	2,276.0
PAY AND ALLOWANCES OF MILITARY PERSONNEL IN R&D	86.7	89.4	94.2	84.1	89.3	92.1
CIVIL FUNCTIONS	11.5	12.3	12.5	11.5	12.3	12.5
DEPARTMENT OF THE NAVY	3,100.2	3,386.2	3,974.5	3,078.5	3,199.7	4,066.1
RDT&E APPROPRIATIONS	3,007.5	3,287.0	3,874.0	2,987.0	3,101.0	3,966.0
PAY AND ALLOWANCES OF MILITARY PERSONNEL IN R&D	90.6	96.8	98.0	90.3	95.9	97.0
SPECIAL FOREIGN CURRENCY PROGRAM	2.1	2.5	2.6	1.2	2.8	3.1
DEPARTMENT OF THE AIR FORCE	3,513.5	3,815.8	4,113.7	3,513.1	3,618.6	3,645.6
RDT&E APPROPRIATIONS	3,271.5	3,572.8	3,873.6	3,271.5	3,375.7	3,405.5
PAY AND ALLOWANCES OF MILITARY PERSONNEL IN R&D	241.5	242.9	240.1	241.5	242.9	240.1
DEFENSE AGENCIES	476.5	606.1	680.7	536.2	607.8	668.0
RDT&E APPROPRIATIONS	470.1	598.7	673.5	529.8	600.4	660.8
PAY AND ALLOWANCES OF MILITARY PERSONNEL IN R&D	6.5	7.4	7.3	6.5	7.4	7.3
DEPARTMENTWIDE FUNDS	1.7	1.7	1.0	3.0	2.0	1.0
DIRECTOR OF TEST AND EVALUATION, DEFENSE	23.9	27.9	29.9	26.8	25.7	26.3
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, TOTAL	2,375.2	2,602.6	2,537.9	2,092.4	2,381.6	2,520.6
ALCOHOL, DRUG ABUSE AND MENTAL HEALTH ADMINISTRATION	135.4	142.6	127.8	114.1	134.5	129.4
CENTER FOR DISEASE CONTROL	42.6	50.7	52.9	44.6	48.9	40.1
FOOD AND DRUG ADMINISTRATION	35.9	36.9	38.0	27.6	28.6	29.7
HEALTH RESOURCES ADMINISTRATION	43.3	34.9	34.9	59.6	34.7	29.9
HEALTH SERVICES ADMINISTRATION	17.3	15.9	13.2	9.9	17.0	14.9
NATIONAL INSTITUTE OF EDUCATION	69.9	70.0	90.0	82.8	70.0	88.0
NATIONAL INSTITUTES OF HEALTH	1,845.5	2,029.5	1,950.3	1,602.8	1,855.7	1,972.3
OFFICE OF EDUCATION	45.9	78.5	88.8	53.1	56.3	77.7
OFFICE OF HUMAN DEVELOPMENT	64.3	70.3	62.0	47.2	60.2	63.4
OFFICE OF THE ASSISTANT SECRETARY FOR EDUCATION	12.6	13.1	13.1	10.6	11.5	11.1
OFFICE OF THE SECRETARY	26.2	25.0	30.6	8.7	32.5	29.6
SOCIAL AND REHABILITATION SERVICE	9.6	9.2	9.2	10.1	9.2	9.2
SOCIAL SECURITY ADMINISTRATION	22.6	25.9	27.0	21.3	22.5	25.2
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT	62.0	68.1	77.7	58.7	63.3	73.8
DEPARTMENT OF THE INTERIOR, TOTAL	280.8	330.0	312.9	242.2	306.0	307.6
BONNEVILLE POWER ADMINISTRATION	6.0	8.6	3.9	3.7	10.2	4.7
BUREAU OF LAND MANAGEMENT	.8	.8	1.0	.5	.8	1.0
BUREAU OF MINES	101.6	139.0	129.2	76.7	118.4	129.1
BUREAU OF OUTDOOR RECREATION	*	*	*	*	*	*
BUREAU OF RECLAMATION	7.8	8.6	8.0	8.0	9.0	8.2
GEOLOGICAL SURVEY	114.5	118.4	114.8	101.9	117.2	114.8
NATIONAL PARK SERVICE	8.4	9.3	9.6	6.4	9.3	9.6
OFFICE OF THE SECRETARY	1.7	2.5	1.7	1.1	1.8	1.5
OFFICE OF WATER RESEARCH AND TECHNOLOGY	19.5	20.9	22.3	23.0	19.0	18.2
UNITED STATES FISH AND WILDLIFE SERVICE	20.6	21.9	22.4	19.0	20.1	20.6
DEPARTMENT OF JUSTICE, TOTAL	44.3	61.8	42.5	43.8	49.8	42.9
BUREAU OF PRISONS	.6	.9	1.9	.6	.9	1.8
DRUG ENFORCEMENT ADMINISTRATION	1.5	5.6	4.3	3.4	4.7	3.6
FEDERAL BUREAU OF INVESTIGATION	1.2	1.2	1.4	.6	1.0	.6
IMMIGRATION AND NATURALIZATION SERVICE	.1	.3	.4	.1	.3	.4
LAW ENFORCEMENT ASSISTANCE ADMINISTRATION	40.9	53.7	34.5	39.2	43.0	36.6

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TABLE C-3. FEDERAL FUNDS FOR TOTAL RESEARCH AND DEVELOPMENT, BY AGENCY: FISCAL YEARS 1975, 1976, AND 1977

(MILLIONS OF DOLLARS)

- CONTINUED

AGENCY AND SUBDIVISION	OBLIGATIONS			OUTLAYS		
	ACTUAL, 1975	ESTIMATES 1976	ESTIMATES 1977	ACTUAL, 1975	ESTIMATES 1976	ESTIMATES 1977
DEPARTMENT OF LABOR, TOTAL	25.4	30.1	34.2	25.4	30.1	34.2
BUREAU OF LABOR STATISTICS	1.8	1.4	1.7	1.8	1.4	1.7
EMPLOYMENT AND TRAINING ADMINISTRATION	15.5	15.8	15.8	15.5	15.8	15.8
EMPLOYMENT STANDARDS ADMINISTRATION	3.2	5.4	5.5	3.2	5.4	5.5
LABOR-MANAGEMENT SERVICES ADMINISTRATION	.8	2.8	2.8	.8	2.8	2.8
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION	2.0	2.3	6.3	2.0	2.3	6.3
OFFICE OF THE SECRETARY	2.0	2.4	2.2	2.0	2.4	2.2
DEPARTMENT OF STATE, TOTAL	27.9	31.5	33.4	28.4	24.9	26.6
DEPARTMENTAL FUNDS	1.2	1.5	1.5	1.2	1.5	1.5
AGENCY FOR INTERNATIONAL DEVELOPMENT	26.7	30.0	31.9	27.1	23.4	25.0
DEPARTMENT OF TRANSPORTATION, TOTAL	311.6	372.3	351.8	324.5	367.2	333.9
FEDERAL AVIATION ADMINISTRATION	105.6	101.3	109.2	110.9	114.0	107.5
FEDERAL HIGHWAY ADMINISTRATION	44.7	47.0	40.8	26.4	54.3	42.0
FEDERAL RAILROAD ADMINISTRATION	32.4	68.6	42.8	42.0	46.2	33.8
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION	34.0	49.2	42.5	36.2	46.6	40.8
OFFICE OF THE SECRETARY	31.3	33.7	29.9	34.5	34.1	29.1
UNITED STATES COAST GUARD	15.9	17.9	18.3	15.5	17.9	17.9
URBAN MASS TRANSPORTATION ADMINISTRATION	47.7	54.7	68.3	59.1	54.1	62.9
DEPARTMENT OF THE TREASURY, TOTAL	1.7	1.8	1.6	1.7	1.8	1.6
BUREAU OF ENGRAVING AND PRINTING	1.7	1.8	1.6	1.7	1.8	1.6
OTHER AGENCIES						
ACTION	.2	.4	.1	*	.5	*
ADVISORY COMMISSION ON INTERGOVERNMENTAL RELATIONS	1.2	1.3	1.4	1.1	1.4	1.4
CIVIL AERONAUTICS BOARD	.4	.5	.5	.4	.5	.5
CIVIL SERVICE COMMISSION	4.4	4.7	3.9	4.4	4.7	3.9
COMMUNITY SERVICES ADMINISTRATION	48.0	39.0	39.0	49.4	39.0	39.0
CONSUMER PRODUCT SAFETY COMMISSION	6.0	5.8	5.6	6.0	5.8	5.6
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION	2,072.3	2,804.0	3,279.8	1,860.3	2,396.8	3,025.6
ENVIRONMENTAL PROTECTION AGENCY	257.7	311.7	246.5	207.2	323.7	298.3
FEDERAL COMMUNICATIONS COMMISSION	1.1	2.0	1.6	.8	1.9	1.6
FEDERAL ENERGY ADMINISTRATION	1.3	3.0	6.1	1.0	3.3	5.6
FEDERAL HOME LOAN BANK BOARD	.7	.8	.8	.7	.8	.8
FEDERAL TRADE COMMISSION	.9	1.2	1.3	.9	1.2	1.3
GENERAL SERVICES ADMINISTRATION	1.8	1.2	2.8	1.7	1.4	2.8
LIBRARY OF CONGRESS	2.6	3.0	3.6	2.5	3.0	3.4
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION	3,064.4	3,448.0	3,546.6	3,181.2	3,402.4	3,550.3
NATIONAL SCIENCE FOUNDATION	595.0	623.1	717.5	571.3	602.4	646.8
NUCLEAR REGULATORY COMMISSION	64.2	101.0	114.4	55.8	87.9	99.5
OFFICE OF TELECOMMUNICATIONS POLICY	4.1	3.1	2.7	4.1	3.1	2.7
SMALL BUSINESS ADMINISTRATION	.2	.6	.6	.2	.6	.6
SMITHSONIAN INSTITUTION	24.8	27.2	33.4	24.2	28.7	31.2
SPECIAL ACTION OFFICE FOR DRUG ABUSE PREVENTION	3.8	*	*	14.9	9.2	*
TENNESSEE VALLEY AUTHORITY	16.6	19.6	22.0	16.5	19.6	22.0
UNITED STATES ARMS CONTROL AND DISARMAMENT AGENCY	1.0	1.6	2.3	1.0	1.6	2.3
UNITED STATES INFORMATION AGENCY	.1	.1	.1	.1	.1	.1
VETERANS ADMINISTRATION	94.8	101.3	99.6	94.8	101.3	99.6

* INDICATES AMOUNT LESS THAN $50,000.

SOURCE: NATIONAL SCIENCE FOUNDATION.

APPENDIX D

Statistical Tables
Part II

Federal Funds for Scientific and Technical Information

D-1. Summary: fiscal years 1975, 1976, and 1977
D-2. By agency: fiscal years 1975, 1976, and 1977
D-3. Intramural and extramural obligations, by agency, fiscal years 1975, 1976, and 1977
D-4. By agency and activity: fiscal year 1975
D-5. By agency and activity: fiscal year 1976 (estimated)
D-6. By agency and activity: fiscal year 1977 (estimated)
D-7. Publication and distribution, and symposia and audiovisual media, by agency and subcategory: fiscal year 1975
D-8. Publication and distribution, and symposia and audiovisual media, by agency and subcategory: fiscal year 1976 (estimated)
D-9. Publication and distribution, and symposia and audiovisual media, by agency and subcategory: fiscal year 1977 (estimated)
D-10. Documentation, reference, and information services, by agency and subcategory: fiscal year 1975
D-11. Documentation, reference, and information services, by agency and subcategory: fiscal year 1976 (estimated)
D-12. Documentation, reference, and information services, by agency and subcategory: fiscal year 1977 (estimated)
D-13. Intramural and extramural obligations, by agency and activity: fiscal year 1975
D-14. Intramural and extramural obligations, by agency and activity: fiscal year 1976 (estimated)
D-15. Intramural and extramural obligations, by agency and activity: fiscal year 1977 (estimated)

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NOTES

- Estimates for 1977 are based on *The Budget, FY 1977*, as submitted to Congress, and do not reflect subsequent appropriations and apportionment actions.
- Obligations reported for extramural performance are limited to contracts or grants with private individuals or organizations outside the Government that have as their primary purpose the accomplishment of scientific or technical information functions. Excluded are obligations for information efforts that supplement or support work under R&D contracts or grants.
- Obligations for Research and Development in Information Sciences, Documentation and Information Systems, Techniques and Devices, are also reported under R&D obligations in part I.
- Defense Agencies include the Defense Advanced Research Projects Agency, the Defense Nuclear Agency, the Defense Supply Agency, and the Defense Communications Agency.
- Within the Department of Commerce data formerly reported under the Social and Economic Statistics Administration are now reported under the Bureau of the Census.
- Within the Department of Labor the former Manpower Administration has been renamed the Employment and Training Administration.

Other Science Resources Publications

REPORTS	NSF No.	Price
Characteristics of the National Sample of Scientists and Engineers, 1974		
Part 1. Demographic and Educational	75-333	$1.90
Part 2. Employment	76-323	In press
Part 3. Geographic	76-330	In press
U.S. Scientists and Engineers, 1974	76-329	$1.25
Detailed Statistical Tables. Manpower Resources for Scientific Activities at Universities and Colleges, January 1976	76-321	—
Projections of Degrees and Enrollment in Science and Engineering Fields to 1985	76-301	$1.15
The 1972 Scientist and Engineer Population Redefined		
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REVIEWS OF DATA ON SCIENCE RESOURCES

No. 27. "Education and Work Activities of Federal Scientific and Technical Personnel, January 1974"	76-308	$0.40
No. 26. "Energy and Energy-Related R&D Activities of Federal Installations and Federally Funded Research and Development Centers. Funds, FY 1973-75 (est.) and Manpower, Jan. 1973-75 (est.)"	76-304	$0.35
No. 25. "Doctoral Scientists and Engineers in Private Industry, 1973"	76-302	$0.35
No. 24. "Work Activities of Employed Doctoral Scientists and Engineers in the U.S. Labor Force, July 1973"	75-310	$0.65
No. 23. "R&D Expenditures of State Public Institutions, Fiscal Year 1973"	75-311	$0.25

HIGHLIGHTS	NSF No.	Price
"Employment of Academic Scientists and Engineers Increases 3 Percent in 1976"	76-328	—
"Largest Increase in Employment of Doctoral Scientists and Engineers is in Industrial Sector: 1973-75"	76-326	—
"Self-Supported Graduate Science Students Increased by 22 Percent in 1975"	76-320	—
"The Nation's Science and Engineering Manpower Resources: 1974"	76-312	—
"Academic R&D Spending Up 12 Percent in FY 1975"	76-307	—
"Racial Minorities in the Scientist and Engineer Population"	75-314	—